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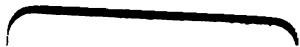
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This new "Treatment of the Sick," with especial reference to the use of the active principles and other positive definite medicaments, not only contains the living essentials of Dr. Waugh's old book, whatever has stood the test of time and progress, but the very latest (practically all the rich store) in modern medicine. It is a dependable, every-day help that you will appreciate.

**BY**  
**WILLIAM F. WAUGH, M. D.**  
**WALLACE C. ABBOTT, M. D.**

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YASSEL BNA

## P R E F A C E

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In the preparation of this book, in addition to their own personal experience, its authors have availed themselves of the best material at their disposal, taking what they believed to be good from every source. It is impossible to acknowledge each of these separately, or to trace to its original source every bit of information presented; nor would it add to the value of the work in the least, though largely increasing the labor. And time is too short and art too long to admit of useless or unfruitful work. But especially do the authors desire to acknowledge their indebtedness to Osler's and Anders' text-books, Babcock on the Heart, Nothnagel's Encyclopedia, Pearce on Nervous Diseases, Manson on Tropical Diseases, whose lucid descriptions and up-to-date pathology have been freely drawn upon throughout. But as we have not hesitated to take material from other sources, and to modify in accordance with our own views, it must be understood that no responsibility is to be attributed to these or other authors for any statements made, except where their names are cited in the text of the work.

In the sections devoted to treatment the authors have depended largely on their own experience and that of the great body of physicians employing the active principles, as presented in the pages of *The Alkaloidal Clinic*, and its successor, *The American Journal of Clinical Medicine*. The superiority of these modern methods and remedies has been strongly impressed upon the writers by comparing them with their former treatment, as shown in a work written by Dr. Waugh before he began the use of the alkaloids. The improvement in prognosis is especially striking. In fact, that comparison enables one to realize the great advance in the art of prolonging life, that has resulted from the substitution of reliable, accurate and uniform agents for the old crude and uncertain weapons with which we feebly endeavored to cope with disease. The problem in organic disease is not now so much as to the extent and character of the lesions as to the remainder of vital force, and the intelligence of the patient.

The substitution of the active principles for cruder vegetable preparations seems to the physician who has not made the change one too trivial to warrant the enthusiastic claims of those who have made it and mastered the applications of the new remedies. But in truth, it is little if anything short of a revolution in therapeutics. The certainty with

which we can apply in practice remedies that are uniform and precise in their effects, and whose powers have been accurately determined by the most scientific study and experiment; the rapidity with which the naked, soluble alkaloid gets to work; the ease with which the effects of single agents of this sort may be appreciated and the dosage accurately regulated; the application of these remedies to the pathologic conditions presenting rather than to the hypotheses expressed by the nosologic designations of diseases; these and many other advantages result in placing the physician on a different plane as regards his clinical work. He insensibly gets in the habit of closely watching his cases, to appreciate the pathologic conditions and take cognizance of the effects of his remedies; he learns to intervene promptly and decisively, as he recognizes the opportunity and knows his weapons; and inevitably his work acquires a decision and precision that produce similar characteristics in his mental habitude.

As he ceases to speculate on the probabilities that may follow the administration of drugs, and acquires the habit of prompt and decisive intervention, things become possible to him for which he would not previously have made an attempt. His prognosis becomes more hopeful as self-confidence arises, as consciousness of power to control the situation becomes his prevalent state of mind.

To the outsider this reads like a fairy tale; one who has not the experience will not assimilate it.

In conclusion we will state that active-principle medicine is not a school, nor a system; it has no creed to be embraced; it has no abjuration to exact. The remedies it advocates are non-secret, non-monopolistic; free as the air to every druggist and physician, to make, dispense and use, without paying tribute to any one. Their applications are based on physiologic experiments carried out with a precision absolutely impossible with the older remedies. They offer to the medical profession for the first time an opportunity to escape from empiricism and base its practice on a strictly scientific foundation. Mystery and superstition are finally banished from therapeutics, and the medieval shadows dissipated by the broad daylight of knowledge.

The work is by no means complete. Much, very much, remains, for generations of experimentors and clinical observers. But to him who has not been over the ground it will be a matter of astonishment that so much has been done. Now that for the first time this material has been collected and arranged, its applications reduced, though all too rudely, to system, we are amazed that the profession—including ourselves—has been so slow to appreciate it.

DRS. WAUGH AND ABBOTT



# PART I

## INFECTIOUS MALADIES

### FEVER AND ITS MANAGEMENT

The older works on practice devoted many pages to the consideration of fever and its treatment. This has entirely disappeared from the modern text-books, in which not a paragraph is devoted to fever *per se*, but every specific fever is treated by itself. The disadvantage of this to the young practitioner is obvious. He does not meet cases with the diagnosis accompanying them, on a tag attached to the patient's body. He is, therefore, bewildered and knows not what to do, until with the assistance of competitors, or with the lapse of time too precious to be lost, he has succeeded in establishing a "diagnosis." Then the matter is easy enough—he has only to refer to his prescription books, to select a formula which has behind it the most illustrious name, or which contains the largest number of ingredients, and this he delivers over to his patient, with the comfortable conviction that his whole duty has been done! Nevertheless, he could easily recognize at his first visit the presence of fever, and without delaying a single hour he could and should institute an effective therapy, even if his observation had not revealed a single fact in addition to this one of a rise of temperature.

Not that we are recommending or sanctioning the neglect of further investigation, and of making a name-diagnosis at the first moment when the evolution of the malady will permit it. This goes without saying. We are only insisting on the necessity of prompt intervention by the physician at the earliest possible stage of the disease.

There are some things that are always right for the physician, and one of these is to intervene, if possible, before a malady has become so firmly seated in the tissues affected that it will run its course in spite of his intervention. Our forefathers believed implicitly in the possibility of aborting pneumonias. Since their most formidable weapons fell from our degenerate hands, the belief founded upon the use of their *pilum*, venesection, has faded away. We do not need the lancet today; we know what it accomplished, and how. Without its ill effects we cure by the use of not less powerful, but equally efficacious and less objectionable means.

Progress is never uniform, never general. It goes by leaps and bounds, advancing and receding, winning a foothold here and slipping back there. And when a permanent advance has been won at any point, it may be a long period before the contiguous territory ceases to be hostile land, in which we have merely established an outpost.

In the science of medicine the pathologist has carried our banner well to the front; but the *materia medica* has not moved forward correspondingly.

Pathology says: "What do you know as to the effects of drugs on the morbid conditions of the tissues?" And while awaiting the answer to this question we have settled down, in the treatment of fevers, into an expectancy as vicious as it is impotent for good. Why under Heaven these patient "expectors," who sit still and let the disease run riot through the patient's body, should "expect" to be employed or paid, is one of the things no man has yet been able to explain satisfactorily—to the patient at least. If we must suffer the pangs of disease, why should we pay anyone for simply acting as a spectator?

The doctrine we present here contemplates a different attitude of the physician, and one more in accordance with the views of his employer. He is to actively intervene in the case, every moment of its existence, from the time the first microorganism alights on the patient's tonsil until he is restored to his place in society.

Accepting at their full value the conclusions of modern science as to the causation of disease by microorganisms, we shall base on them our system of treatment. There must be an avenue by which these pathogenic germs obtain access to the human body, and in the tonsils we find a point less perfectly protected than usual. The connection of tonsillar inflammations with rheumatism has been abundantly shown, and this has opened our eyes to the fact that a similar connection exists with other infectious maladies. In all epidemics of the eruptive fevers, typhoid, pneumonia, etc., many cases occur of tonsillar inflammation, some followed by attacks of the prevailing epidemic, and others not; and we find that many of those so affected also escape all subsequent epidemics of that malady. The only explanation as yet offered for this curious phenomenon is that the patients have been affected by the malady just enough to render them immune against it, though not enough to cause a typical attack.

This being the case, it behooves us to pay special attention to the tonsils, and to meet every indication of inflammation of these organs with effective germicidal applications, such as saturated solutions of salicylic or boric acid, hydrogen peroxide, resorcin, the mineral acids, etc. The

principle is the most important thing—the selection of a remedy can be left to individual choice. But the chlorides have long been noted as effective remedies for the throat and the domestic gargle of salt water does not merit contempt. Possibly none is more efficient than chlorine water, readily prepared extemporaneously by placing in a 4-oz. vial a dram of powdered potassium chlorate, adding a dram of strong hydrochloric acid, and as the fumes of chlorine fill the bottle adding water to make four ounces. A teaspoonful of this in an ounce of water, every one-half to two hours, is sure death to every microbe with which it comes in contact.

But suppose the microbes have gotten past the door, and effected a lodgment in the body. Then we have the period of incubation. During this, what is going on? The invaders are gathering their forces, multiplying, so that in a given time they may make their grand assault upon the vital forces. In the original settlements made by them there is a scene of the most intense activity.

But what are we doing in the mean time? Nothing. We are waiting. For what? God knows.

In his struggle with the Catalans St. Cyr was accustomed to withhold his hand until the enemy had gathered into an army, that he might destroy it at once, instead of wasting his energies pursuing the elusive bands of guerillas. But we have no such resources for combating essential fevers. We are as powerless as ever when the grand attack is delivered, and still have to maintain our pose of observation.

If the microbes are few in numbers during the incubative period, if they are not yet ready to deliver their blow, it seems the part of wisdom to choose this time to strike them, when they are weakest. But can we do it? Are there any weapons that we can bring to bear upon them at this time?

There are two remedies that have been proposed for this purpose: One was introduced by an obscure country doctor in the West, who had observed its good effects in the treatment of snake-bites. This is *echinacea angustifolia*. This plant has been tried by many physicians, in the whole range of infectious maladies, and it is confidently asserted that it is a systemic or hematic disinfectant, combating the specific causes of these maladies, of every sort. In health it seems to have little if any effect upon the bodily functions. The nearest approach to an active principle of *echinacea* yet obtained is *echinol*. Of this gr. 1-6 may be given every half hour until its good effects are manifested by ameliorating the septicemic symptoms. As yet we are unable to give any indications as to full effect or the doses usually required; it is not toxic and should be pushed until the malady subsides.

The other remedy is sulphydric acid, in the form of calcium and arsenic sulphides. Either of these is to be given in small and rapidly repeated doses until the body is saturated with the drug, as shown by the odor of the acid on the breath and the skin. In some cases saturation is denoted by the occurrence of nausea. When this occurs the doses are to be given less frequently, just enough to keep the body in the state of saturation.

The theory of its action is simple enough—the existence of any pathogenic microorganism in the body saturated with the sulphides is impossible. Keep up this saturation for a week, and no living bacteria can be found in the body. It matters not what may be the organism, all fall before this potent destroyer, say its advocates.

Let us add that in spite of the bad name given it by the older physiologists, there is absolutely no danger in this medicament, and no harm accruing to the user. Calcium sulphide has been administered to adults with gonorrhea in doses up to 40 or 50 grains a day, with only good results; and to infants with diphtheria in doses of gr. 2 every hour, with like safety. In these cases, however, there may well have been a neutralization of the drug by the toxins of disease; but in seeking to temporarily inhibit the sexual function, calcium sulphide has been given to masturbators in similar doses, with success and no sign of toxic action.

These methods are at your service, if you desire to try them. It is certain that many physicians in active practice are using them every day, and are enthusiastic in their praise. Moreover, it is stated as a fact that no mosquito, flea, bedbug, louse, chigger, redbug, or other insect parasite, will bite a person saturated with calcium sulphide; so that there seems much reason to believe that the parasites of microscopic size are no more able to withstand its influence.

When Metschnikoff first announced the phagocytic action of the leucocytes, the startling idea was received much as Verne's quasi-scientific romances. The hypothesis proved useful as a ready means of illustrating, figuratively, many phenomena, and has insensibly become fixed in our minds as a fact accepted. The power of nuclein to increase the number and activity of the leucocytes has been proved, and it is difficult to escape from the conclusion that acceptance of the phagocyte theory carries with it the logical indication for the use of nuclein in all maladies attributable to invading microorganisms. It has been found that of the standard nuclein solution doses up to a dram each twenty-four hours increase leucocytosis correspondingly. This remedy is therefore applicable in all infectious maladies.

The next point we wish to discuss in the treatment of fevers, is that of intestinal sepsis. This is a matter deserving grave consideration.

The contents of the bowels are within the bounds of the body, and yet not in it, in so far as that they are outside the influence of its vital forces. They consist of highly fermentable material, swarming with bacteria, with the requisite heat and moisture, and the constant addition of fresh material to keep up fermentive processes. The activity, virulence and multiplication of microorganisms is vastly increased during any fever. The safety of the body lies in two factors: The constant movement forward and dejection of these matters, and the disinfecting action of the various digestant fluids, especially the gastric juice.

That the first of these is uncertain requires no proof. Cases have been reported in which persons have ejected from the bowels substances swallowed seven months or more previously. What possibilities in the way of decomposition and autotoxemia exist here. The practice of beginning the treatment of every case by completely emptying the alimentary canal, is one strictly in accordance with modern science, and supported by common sense as well as by clinical experience.

The influence of the liver in disinfecting the bowels has been largely overestimated. Recent investigations have shown that the bile is an excellent culture ground for various microorganisms, and that at least the colon bacillus may in the gall-bladder acquire pathogenic powers. The typhoid bacillus also retires there for recuperation, and descends thence into the bowel with increased virulence; and this is believed to explain certain relapsing cases of this fever. Besides, one of the invariable results of fever of all sorts, is to decrease or suspend entirely the secretion of bile, and of all the digestive fluids; so that this means of disinfection is cut off at the very time it is most needed.

From this it is evident that in every fever a certain proportion of the symptoms is attributable to the decomposition of the contents of the bowels, and the absorption of the toxic substances thereby formed. The use of cathartics followed by intestinal antiseptics is therefore a routine procedure in every case of fever, of whatever nature.

When these agents have been given in sufficient quantities to free the stools from all abnormal odor, it will be invariably found that about 40 per cent of the fever and other symptoms will have subsided. Especially the muscular aching, delirium, headache, restlessness, general malaise, neurotic phenomena, insomnia and other general symptoms, will be moderated or entirely removed—and when 40 per cent of any febrile attack is dissipated, it must be a pretty poor sort of a doctor who can not handle the balance. Just here let us ask you not to tell us that the alimentary canal cannot be sterilized. We all know that; but nobody has claimed that such complete sterilization is essential, and the results of

actual applications of this system are amply convincing as to its utility, explain it as you please.

Is it ever wrong to thoroughly empty the bowels and render them aseptic? Even the presence of local intestinal disease, such as tubercular or typhoid ulceration, does not constitute an exception; it only indicates a difference in the measures to be employed; for surely it can do an intestinal ulcer no possible good to be constantly bathed with fetid fecal matter, reeking with innumerable pathogenic organisms of many varieties. We will suppose that in such conditions the physician will give moderate doses of salines to liquefy the contents of the bowels, and that he will aid them by flushing the colon with lukewarm water containing non-toxic antiseptic agents, such as a saturated boric or salicylic acid solution, or zinc sulphocarbolate 5 to 10 grains to the pint. If there is no such intestinal condition to warn him, he will give his patient calomel, a grain in broken doses, followed by saline laxatives, until he is certain that the alimentary canal has been completely emptied. Then, if the offensive odor of the stools indicates it, he will give some such intestinal antiseptic as the sulphocarbolates, until all such abnormal odor has disappeared. Adults require one or two scruples daily of zinc sulphocarbolate for this purpose; double these doses of the lime or soda salt. It is by no means to be taken for granted that one or more fluid stools, the last one light and odorless, indicate the complete removal of feces from the bowel. Sometimes days or weeks may be required to remove accumulations that have been sidetracked or channeled for months. These may be discovered by palpating the abdomen or, as the writer has often proved, by the continuance of symptoms indicating fecal toxemia.

We now come to the treatment of the fever, *per se*; and here again our practice is based on the soundest principles of modern pathology. For it is certain that the first step in every inflammation is derangement of the circulatory equilibrium, whereby an excess of blood appears in the inflamed part, with necessarily a corresponding anemia elsewhere. Now if we remove this excess of blood from the inflamed part and restore it to the parts that have too little, it is obvious that the subsequent steps of the attack, diapedesis of white cells, extravasation of blood, etc., cannot take place; and the malady is stopped—jugulated.

We may accomplish this in two ways—by increasing the tonicity of the dilated vessels, or by relaxing those that are contracted and empty. The first object may be secured by giving the powerful vasomotor tensors, strychnine and digitalin; and these constitute the chief means employed by many leading physicians in the treatment of pneumonia. The second may be fulfilled by the administration of the vasomotor relaxants, vera-

trine and aconitine; and the first named, under the form of tincture of *veratrum viride*, is perhaps the most popular remedy in the United States today for pneumonia.

Whichever is chosen, the same object is attained—the restoration of circulatory equilibrium. It is asserted that both these processes can go on together, the cells whose tonicity is below par taking up the tensors, while those in a spastic state absorb and utilize the relaxants. At first sight this seems unreasonable, but when we reflect that every living cell in the body selects from the blood what food elements it stands in need of, and rejects the rest, there is no special reason for refusing to credit them with a similar power as to the selection of medicines. And if it comes to that, is it so easy to draw the line between foods and medicines?

Besides, those who have put this theory to a practical test are unanimous in their reports, that the results are better than when either the tensors or relaxants, stimulants or sedatives, are employed alone.

The basal prescription for fever is therefore aconitine and digitalin. The former stimulates cardiac inhibition, slowing and regulating the pulse, relaxing vascular tension and lowering temperature. Digitalin also strengthens inhibitory control, slows and strengthens the heart, restoring vascular tension where it is deficient. We speak of the water-soluble digitalin, whose effects are manifested within half an hour of its administration. To these Burggraeve added strychnine arsenate, constituting the Dosimetric Triad (amorphous aconitine and strychnine arsenate aa gr. 1-134, digitalin gr. 1-67). Strychnine is the most powerful vital incitor, energizing every organ and function of the body, especially combating the tendency to debility which increases with every day of febrile waste. This combination is especially indicated in adynamic forms and stages of fevers. It should be given according to the needs, every ten to sixty minutes, one to two hours, until the pulse gradually approximates normality, at which it is to be sustained.

The primary action of arsenic is the induction of fatty degeneration. Acting on the newly deposited debris of the febrile processes this is more quickly melted and put in condition to be removed by the lymphatics. To arsenic is less certainly attributed also the power of specifically improving the nutrition of the heart-muscle.

To the basal aconitine and digitalin Abbott added veratrine, constituting the Defervescent Triad, or "Defervescent Compound" as commercially known. In small doses veratrine also increases inhibition, slows the pulse, increases vascular tension, not by contracting the lumen of the arterioles, but by directly increasing the power of the cardiac muscle fibers. Veratrine also opens every door of elimination, and is the most effective

medicinal agent known in removing from the body the toxins generated by the infectious agents, or by morbid metabolism, or those absorbed from the alimentary canal. It is therefore in its action a safeguard against toxemia and over-dosage. When the toxic action of veratrine commences this is first manifested by a sense of warmth outlining the stomach, when the remedy should be suspended, or given in smaller and less frequent doses. If pushed, as must be done in profound toxemias, like uremia, nausea and diarrhea will be induced and in still larger doses the heart will be depressed. We can not conceive of peril arising from the internal administration of this alkaloid by any person of average intelligence who has been told of its effects as above described.

The applications of this powerful defervescent compound are found in sthenic forms and phases of fevers, and all cases where marked evidences of toxemia persist after thoroughly emptying and disinfecting the bowel. In the doses advised veratrine should be looked upon as a cardiac tonic instead of a depressant. As compared with *veratrum viride*, the latter does not display the preliminary increase of vascular tension described; otherwise the action of the two is identical except that veratrine is uniform, *veratrum viride* displaying the variability as to action and strength inevitable in all tinctures and extracts.

In treating any fever those two combinations may be employed, one or the other, as *asthenia* indicates Burggraeve's Triad at one time, or *toxemia* indicates Abbott's at another. By changing from one to the other the general effect is sustained and the varying conditions are met.

By these general measures the physician will have gone so far in the treatment of his patient that he may, in fact, find a name-diagnosis impossible, for what had presented every indication of developing into a pneumonia, or typhoid fever, has so changed its aspect that in a very short time the patient is well; and the physician will find considerable difficulty in classifying his case, unless he has made those laboratory tests which afford some degree of certainty as to the microorganisms engaged.

The development of the case will, of course, bring with it indications for special treatment, as the symptoms point to one malady or another, one locality or another affected; but if our young friend has improved the shining hour in the way we have suggested, he will have nothing to regret or retract, but will simply add the specific treatment indicated to that which he has already instituted.

Especially do these remarks apply to the treatment of the febrile maladies of infancy, the infections most common during this period of life; so also to the results of "catching cold." But the vast majority of non-specific febrile attacks in early childhood may be confidently attribu-



ted to the alimentary canal, and the treatment above described applies with peculiar force to such cases.

This treatment applies to all fevers where the temperature is below 105° F. Above the latter point we have hyperpyrexia, and here a special indication presents, for the delicate structures of the human brain cannot long withstand such heat and our intervention must be prompt and powerful. Sometimes venesection is our best resource, bleeding to effect. Usually we succeed best by applying cold to the scalp and skin, ice, or cold water, by baths, affusions or packs. Ice-water may also be thrown into the rectum. For the general practitioner encountering prejudices of the illiterate and working with unskilled assistants, an excellent plan is that of McCall Anderson: Have the patient lying on the back, covered with two blankets so folded that one may be turned down and the other up to quickly expose the patient's abdomen; to this apply a folded towel squeezed out of ice-water, and at once cover with dry flannels and replace the blankets. It requires but a few seconds to whip off the towel and apply a fresh one. This is to be done every minute for half an hour out of every two hours; in the intervening time the abdomen is to be covered with warm, dry flannels. Care is to be taken to avoid wetting the bedding; best by stuffing flannel, wool or absorbent cotton along the patient's sides. The effect on the temperature is decided, the relief such that the patient will overrule any objection on the part of the family, and the disturbance incident to shifting the patient to and from a bath is avoided. This method fully replaces the cold pack and is much easier as well as less terrifying to those unused to hydriatic procedures. This procedure may be employed in any case in which the temperature exceeds 103° F., provided the duty of emptying and disinfecting the bowels is not neglected. We have no fault to find with the cold-bath treatment of fever except that those who advocate it seem inclined to rely too much on this procedure, neglecting to remove the cause while seeking to smother the effect. Granting that the elimination of toxin is stimulated by cold baths, this is better accomplished by the use of veratrine and attention to the bowels.

Elimination by the kidneys is so essential to the continuance of life that it must be one of the daily duties of the physician to see that it is sufficient. One of the best means of flushing the blood and kidneys is throwing into the colon a pint of decinormal saline solution, very gradually, at body temperature, to avoid exciting peristalsis. This also relieves thirst and muscular cramps.

Each special form of fever may require special additions, or not, as the case may be; such as quinine for malaria, salicylic acid for rheumatism, pilocarpine for erysipelas, etc.; and in every case the duty of render-

ing the house and vicinity hygienically clean, of enforcing a proper administration of the sick-room, of guarding against the spread of the infection, remains as imperative as of yore. In fact, the physician who believes in utilizing the resources at his disposal in the treatment of fever, will find his occupation strenuous enough to satisfy even Mr. Roosevelt. (The hygienic management of febrile maladies is treated at length in the section on typhoid fever.)

### FEBRICULA

A very bright young lady physician, in an after-dinner speech which would have done credit to Depew, said that after graduating it was good to go to a hospital for a year, or to some other place, to learn something about diseases as they really are and not as they are depicted in text-books. It goes without saying that that young lady had had some years of actual practice or she could not so aptly have expressed the true condition of affairs. Not that we are finding fault with the text-books—they do the best they can, and describe typical cases—but somehow when we get out in the broad field of actual work none of our cases is typical. By diligent search we may find something approximating their description in the corollaries, if there are enough corollaries—but you all know how it is.

A few years ago we were taught that all the aberrant forms of continued fever coming our way were surely typhoid, but we imagine very few will take this ground now.

Febrile attacks frequently appear and pass off, without pursuing the typical course of any known malady and without discernible evidence of local inflammation. They may last a few hours or several days. Many such cases are seen during the epidemic prevalence of typhoid fever, scarlatina, measles and other infections; and as some of the persons thus attacked display immunity against these maladies then and afterwards, it is presumed that they are atypic or abortive cases of the prevalent disease. In others there is a non-diagnosed or diagnosable rheumatism, pneumonia, tonsillar or other local inflammation, especially in children.

Osler describes a third group where the attack comes from the inhalation of sewer gas or foul odors. The attack may be colicky, with vomiting and diarrhea, fever and chills, going on to collapse; or a low continued fever with debility and anorexia.

In the vast majority of these cases the condition is an autotoxemia, from the intestines. Not so often from the food—the gastric juice is

wonderful in its power of disposing of abominations—but from the decomposition of fecal matter left beyond the normal period in the bowel, or deprived of the antiseptic action of the bile and other digestive fluids. This condition has been observed most frequently in children, because their impressible nervous systems have not as yet acquired toleration as they do in adult years. Clinically, this is shown by the promptness with which relief follows clearing out and disinfecting the bowels, and by the constant presence of constipation, bad breath and fetor of the stools, in these cases.

The fever may run up to  $104^{\circ}$  F. on the first day, or may linger longer at  $101^{\circ}$  in the morning and  $102.5^{\circ}$  in the evening for some days, or for several weeks, without showing any distinctive signs of typhoid or of malaria. Headache, backache, nausea, anorexia, malaise, heavy breath, constipation, red and scanty urine, insomnia, and even a little nocturnal delirium, may be present. With children the most notable evidences of sickness may be impatience and crossness, loss of appetite, thirst, disturbed sleep and fetid stools. They vomit readily.

The diagnosis is made by exclusion at first, the absence of definite indications of any known fever or inflammation narrowing the case down to the present category. As the physician gains experience he learns to recognize the malady at a glance, and his fears of typhoid are less frequently expressed.

In the numberless mild cases that occur with children there is peace to the household in an efficient and palatable laxative, kept at hand and given whenever crossness or failure of appetite indicates the need. The alkaline syrup of rhubarb, with sodium sulphocarbolate gr. 10 to the ounce, in doses of one to four drams every two hours till the bowels move, answers well and often prevents more serious indisposition. In more severe forms give calomel, gr. 1-6 to 1-67 every half-hour for six doses, followed by a saline laxative, and enough zinc sulphocarbolate to render the stools inodorous. Aconitine for the fever is usually required—just enough to do the work, no more. After the bowels have been emptied and disinfected a few granules of juglandin, gr. 1-6 to 1-2 for a child, before each meal, with quassin gr. 1-67, if languid and relaxed, will soon restore the digestive secretions to their normal condition. If the fever has been high for a few days there may be quite a discharge of sabulous matter in the urine as the fever breaks; or a critical sweat. The diet should be as nearly nothing as possible, consisting of cool drinks, barley or rice water, weak soups or tea. Lemonade is useful and a good excipient for the simple remedies employed.

These attacks may usually be avoided by attentive observation of the child. A heavy breath, coated tongue or simply a display of temper,

suffices to show that things are not right. If at this time the patient is given the requisite remedies to clear out the bowels, and a few granules of juglandin, the attack will be averted.

Juglandin is a remedy whose value grows upon one the more he employs it. It closely resembles rhubarb in its action, but has the advantage of a small dose and ease of administration, as well as uniformity of effect. It is laxative and tends to stimulate all of the intestinal secretions in a normal, healthy condition; hence it is a restorer of digestion. For a child two years old one-sixth of a grain may be given every two hours, until it has acted on the bowels. For an adult from one to three grains before meals acts nicely.

Quassin is highly regarded in France as a toner of the digestive system. This is a curious remedy in some respects, since it requires but an exceedingly minute dose, in fact the results seem to be due to the impression made by it upon the gustatory nerves. Take for an instance the use of a quassin cup: Into this we pour a little water; let it stand for a few minutes, when on drinking it we find it decidedly bitter. Such a cup may be used daily for a year or more without its efficacy diminishing markedly. It is obvious that very little medicine is taken with each dose and yet the good effects are unquestionable.

In France school-children are supplied with a drink which contains minute quantities of quassin, phosphoric acid and glycyrrhizin, the active principle of licorice. This is supplied by the authorities on the recommendation of the Faculty of Medicine. The acid tends to relieve thirst; the quassin imparts tone to the digestive mucous membranes and checks the disposition to immoderate drinking frequently manifested in very hot weather. The licorice covers the bitterness of the quassin and imparts a faintly sweetish taste to the beverage which renders it quite acceptable to the little ones. Such a drink would be useful in many cases of illness even more serious than a febricula.

Salivas (*La Dosimetrie*), speaks of a combination of veratrine, aconitine and brucine as in constant use for the medication of infants. Tous-saint pronounces this defervescent and decongestant triad very useful for these little patients. He prescribes it in the eruptive fevers, capillary bronchitis, pneumonia, bronchopneumonia, whooping-cough, croup, etc. In small doses these alkaloids moderate the great cerebral and respiratory centers, lower the temperature, and render less frequent and lively the cardiac and arterial contractions; rendering these agents in consequence sovereign defervescent, decongestants and calmants.

Illoway reported good results from veratrum and aconite, which would have been better had he employed the alkaloids and added brucine. The

latter in small doses does not modify sensibility but increases the reflex excitability of the spinal cord; thence come reflex contractions of unstriated muscle fiber, and increased peristaltic movements of the stomach and intestines; digestion and defecation are facilitated, as well as miction and erection—in a word, brucine stimulates the entire organism and arouses the depressed vital force.

## SYNOQUE

Ephemeral fever, a malaise rather than a malady, is characterized by slight gastric difficulty, a little aching and moisture of the head, followed by epistaxis or a patch of labial herpes and usually accompanied by a diminution of the urine, which is muddy and red. Two days' resting and dieting, a good washing of the digestive canal with saline laxative, and a diuretic drink, usually suffice to cure this indisposition.

Synoque is a more serious malady, holding the middle place between the affection above described and typhoid fever. It shows rigors, intense heaviness, painful headache, a pronounced and obstinate saburral condition, offensive stools; and thirty years ago was called a "little mucous fever." In reality, whether simply inflammatory or bilious and mucous, as practitioners still believe, it is a continued fever, which may last many weeks, and very often is only cured after prolonged convalescence. A chauffeur lay fifteen days with synoque, and on the twentieth day took to his bed with typical typhoid fever, of three complete weeks, after which it was two months before he could return to work.

We look upon synoque as an abortive typhoid, a morbid infectious state in which the intoxication is insufficient to produce the typhoid state. The treatment, therefore, should be severe, the surveillance of patients very attentive and prolonged, to avoid relapses and disagreeable surprises (Toussaint).

Synoque is very frequent in France at certain seasons; when the first cherries ripen, with melons and red apples, sweet wine and new cider. These lapses of diet, the overwork, the free drinking in hot weather, the forced work of sowing, harvesting and the vintage, render this disease in some places almost epidemic.

The first indication is to combat the gastrointestinal condition with emetics and saline laxative. Next we oppose the fever with the deferrescent alkaloids, given every half-hour when the temperature exceeds 100.4° F., at every hour when it is below 99.5° F. Enjoin a liquid diet, give a small dose of saline laxative every morning, and satisfy the thirst with lemonade, soup, milk and bitter infusions. Toussaint advises calcium

sulphide, 8 to 12 granules a day for the infectious element. On account of the intermittency and to prevent morning and evening rises of fever he gives with the sulphide two granules of quinine every hour during the afternoon. With children he prefers quinine hydroferrocyanide, whose effect is very remarkable. If the patient does not digest milk well, it should be cut with soup deprived of fat. During convalescence solid food should be forbidden for a long period, or a relapse will occur, or death itself. There is a bread fever which may here occur, as well as a meat fever.

The French dosimetrists have not yet learned the value of intestinal antiseptics like the sulphocarbolates, which so promptly put an end to such attacks as above described, when given to saturation after thoroughly emptying the alimentary canal.

A lady, 34, married, without children, was seized with a fever in some respects resembling typhoid, but without the diagnostic symptoms. There was severe headache, principally in the forehead; coated tongue, fetid breath, tenderness in the epigastrium and fetor of the stools; but no rose spots nor ileocolic tenderness. The case dragged along for several weeks, the fever rising to 104° F. in the afternoons, moderating somewhat in the mornings. There was no delirium at any time, but prostration without any of the hebetude characterizing typhoid fever. At the time this patient was under treatment autotoxemia was not well comprehended. However, the symptoms continued until the physician summoned courage enough to empty the alimentary canal by the administration of rhubarb and the use of colonic flushing, repeated daily for a week, while intestinal antiseptics were being administered. When the bowels had been completely emptied and the stools restored to their natural odor, the fever subsided and the accompanying symptoms disappeared. The tongue, whose coating had obstinately refused to yield to numerous efforts at treatment, cleaned up promptly and health was quickly reestablished.

A sailor was seized with a chill, followed by a rise of temperature to 104° F., with delirium and intense frontal headache. The tongue was heavily coated, the breath offensive, the epigastrium tender and somewhat puffy; the stools very offensive, the appetite entirely absent. The patient complained that every bone in his body ached and he could get no sleep, being compelled to turn every few minutes as the bones on which he rested his weight soon became painful. Prostration was great. The eyes were somewhat injected, with photophobia; mild delirium occurred at night. The temperature reached 104.5° F. each evening, declining about one degree in the morning. The urine was scanty and very high-colored. This continued four days, when the patient's fever broke up

with a profuse sweat and an enormous discharge of urine heavily loaded with urates. This followed the administration of calomel and saline, the patient having been kept on thin soup during his four days of illness. Convalescence at once set in and the man returned to his duties at the end of seven days from the time he reported at the sick call.

These cases are distinguishable from paratyphoid by the briefer course and the absence of the specific organism.

## TYPHOID FEVER

Typhoid or enteric fever is an infectious malady caused by the typhoid bacillus. It is the common continued fever of the United States, and is also found in all parts of the world. Indeed, in dealing with any attack of continued fever here, it is to be presumed to be typhoid until proved otherwise.

Two conditions are requisite for the production of this fever, a soil suitable for the growth and development of the bacillus, and its entrance into the alimentary canal, or possibly other mucosa, of a susceptible individual.

Typhoid fever is most prevalent in the autumn, and after unusually hot, dry summers. Males and females are equally affected. It is a disease of young adults by preference, but has been seen in infants under one year and in men over sixty. Some persons appear to be immune. One attack generally protects, but second and even third attacks occur rarely. It has become the typical camp fever.

The typhoid bacillus is a short, thick, flagellated motile rod, with round ends, one showing a bright spot. It is cultivable on various media and in this way may be distinguished from other organisms, especially the colon bacillus. Cultures are killed by ten minutes' exposure to a heat of 60° C., but may survive till the twenty-second week a cold of five degrees below zero C. The bacillus resists drying for months, but is destroyed by exposure to the direct rays of the sun for four to ten hours. Cultures are sterilized by solutions of phenol, 1-2 per cent, or of mercuric chloride, 1-25 per cent.

It is not easy to demonstrate the bacilli in the stools, and even with improved methods Elsner could only do so in one-half his cases. Even in fatal cases it was impossible. But they are usually to be found in the blood and the rose spots; and have been found in the intestinal glands, mesenteric glands, spleen, marrow, liver and bile. They have been detected in the urine in about one-fourth of the cases, and sometimes in the sweat, sputa, endocardial, pleural and meningeal fluids, and in purulent collections.

In ordinary water the typhoid bacilli disappear in two weeks, being probably destroyed by other microorganisms. In ice they mostly die within two weeks, but have been found alive at the end of eighteen weeks. It is rarely possible to identify them in water, but Prudden detected them in filters. They develop rapidly in milk and may live three months in sour milk, or for some days in butter. In fecal matter and in the soil they exist for many months. They retain vitality in earth for 21 days, in sand 82 days, in street dust 30 days, on linen 60 to 70 days, on wood 32 days. (Osler.)

Direct contagion is rare; and only through the stools and linen. Foods are probably infected by dust containing the bacilli. Water infection by the stools of patients suffering with typhoid is the most frequent source of transmission. Milk is so prone to take up this poisonous organism that it is believed to have been infected by the water used to cleanse the cans. Many vegetables are now forced for market by watering them with diluted sewage, and here the danger of direct transmission is great. Oysters fattened in waters into which sewage is emptied become a source of infection. Flies walking on infected fecal matter carry the bacilli on their feet, to the food and perhaps directly to human beings.

Dirt, offensive cesspools, decaying organic matters, can not in themselves originate typhoid fever, but they probably offer congenial soils for the development of the germs, and then become sources of infection. The writer has made observations that led him to believe that the air from infected sewers conveyed to bedrooms by stationary washstands carried with it the typhoid infection; the same has been claimed as to the air of infected privies. While these modes of infection have not been definitely proved it is going too far to say they are impossible, or even improbable.

The most important thing to remember is that infection comes only by means of the excretions, and if these are destroyed it becomes impossible. Were this to be fairly comprehended and acted upon, typhoid fever would soon become a thing of the past. It is within the power of every physician to absolutely prevent any case under his care becoming a source of further infection.

Five groups are recognized by Osler:

I. Ordinary typhoid with enteric lesions. These constitute most of the cases. The force of the disease is exerted on the glandular elements of the intestines, the mesenteric glands and the spleen being involved.

II. Typhoid with slight intestinal lesions. There are symptoms indicating general septicemia with severe toxemia and high fever.

III. Typhoid without any intestinal lesion. The bacilli are found in the blood, but no trace of disease is detected even after careful and



skilled search. The cases are too few to justify the assertion that the bacilli can penetrate a normal intestine, or by any other route gain access to the body, but they render the latter a possible theory.

IV. Mixed infections. There may be also present the tubercle, diphtheria or malarial organisms; or secondary infection with colon bacilli, streptococci, staphylococci or pneumococci, to which typhoid has opened the door.

V. The studies of bacteriology have separated some cases which present the clinical symptoms of typhoid but are not accompanied by this bacillus. Others are present which differ in their cultures and agglutination. These are now termed paratyphoid.

From cultures of the typhoid bacillus Brieger isolated typhotoxin, and Martin a secretion that when injected into animals caused diarrhea, emaciation, degeneration of the myocardium and low temperature. Weaker toxins have been isolated from cultures of the colon and other allied bacilli. But as yet typhoid fever has not been produced experimentally by inoculations with the bacilli.

**Anatomic Characteristics:**—The intestinal mucous membrane is in a catarrhal condition, to which is due the diarrhea. Desquamation of the epithelium attends it.

The specific lesions are seen in the glands of Peyer. This morbid process begins in the upper part of the small intestine and progresses downward, becoming more severe until it reaches its maximum intensity near the ileocecal valve. By this time the glands earliest affected may be well on the way to recovery. It is not essential that all the glands in the intestine should participate in the morbid process, and some may escape entirely. It is of the utmost importance that this should be comprehended, as upon it depends our method of feeding the patient. For if some of the glands were not at every stage capable of performing their functions we would have no chance to nourish our patient. The belief that all the glands are involved at once has even led to the dogma that nourishment is impossible and that the patient lives on his tissues throughout the whole course of the malady.

The first stage of the glandular affection is hyperplasia, and this affects the structures of the small intestine most, but to some extent also those of the colon. The follicles are swollen and project from the surface of the membrane as grayish masses, from the size of a pinhead to a large pea. The process begins with hyperemia, then the lymph-cells multiply and infiltrate surrounding tissues, and the pressure empties the vessels. Some large polynuclear epithelioid cells are found, and others containing red cells. If the pressure is sufficient to cut off the blood-supply

the process will end in necrosis; if not, resolution sets in. The hyperplasia reaches its height in the beginning of the second week. If resolution occurs the contents of the cells become fatty and granular, and are absorbed, the cell breaking down. The follicles subside rapidly, leaving the still swollen septa, giving the patches a reticulated appearance. Slight hemorrhages may occur, and small ulcers form. A similar condition is sometimes found in young children suffering with infectious fevers.

Necrosis is attributed by Osler to the direct action of the bacilli. It may be limited to the mucous coat or extend through the submucous and muscular tissues and involve the serous coat. The sloughs cover the affected patches and solitary glands, varying in color from yellowish to black.

The sloughs separate at the edges, leaving ulcers commensurate with the extent and depth of the necrosis. Ordinarily the mucous and submucous layers are thrown off. The shape of the ulcers is irregular, as several may coalesce. The entire Peyer's patch is not usually lost. Healing commences at the edges and the base, granulations covering in the gap, and the epithelium is regenerated. Local conditions govern the healing, which may be interrupted by extensions. The gland cells are restored, and the site of the ulcer denoted by a depressed pigmented area.

Chomel said that perforation was due either to ulceration or to rupture of the thinned bowel by distention. The latter is the more common. It occurs in about five per cent of fatal cases. It is most frequent in the last part of the ileum, but occurs in the large bowel and sometimes in the appendix. It is possible as long as there are unhealed ulcers in the intestine, hence may occur during convalescence or after the patient has returned to his avocation.

Fatal hemorrhage takes place in about 1-2 per cent of fatal cases. It is due to separation of the sloughs, rarely, if ever, to erosion of vessels.

The mesenteric glands partake in the disease processes, becoming hyperemic, swollen and necrotic in many cases. Suppuration may occur. The glands corresponding to the most intense inflammation are most seriously affected.

Early in the attack the spleen becomes enlarged, soft, intarctions are common, and rupture sometimes occurs. The liver is early affected, swollen, hyperemic, the cells becoming fatty and granular, with lymphoid and necrotic nodules. Abscesses are not unknown. Rarer complications are acute yellow atrophy, pylephlebitis, and affections of the gall-bladder.

Acute nephritis or desquamation with granular degeneration of the tubular epithelium may occur. Lymphoid nodules are formed, which may break down into small abscesses. The typhoid bacilli are found in

these and in the urine. Diphtheritic pyelitis, cystitis, and orchitis are occasional concomitants. Laryngitis, simple, diphtheritic and ulcerative, with necrosis of the cartilages, edema of the glottis, pharyngeal affections of similar nature, pneumonia early or late, hypostatic congestion, pulmonary gangrene, abscess and infarctions, pleurisy and empyema, are more or less frequently met.

In the circulatory system we meet occasionally endocarditis, myocarditis, pericarditis, degeneration of the walls of the heart, endarteritis of the small vessels, and thrombi, cardiac or of local origin, more common in the veins than in the arteries.

Meningitis of several types has been rarely observed. Parenchymatous degeneration of the nerves has been described; also optic neuritis. Granular degeneration of the nerve and muscle fibers is associated with prolonged high temperatures in this as in other fevers. Muscular abscesses may appear during convalescence.

**Symptoms:**—The period of incubation lasts from eight to twenty-three days, according to the Clinical Society. During this period there are usually characteristic evidences of the coming attack. Osler says that in his 829 cases there occurred at the onset chills in 200, headache in 595, anorexia in 414, diarrhea in 322, epistaxis in 182, abdominal pain in 227, constipation in 152, pain in the right iliac fossa in only 6.

The following symptoms were present during the incubation period in the writer's case. He has by inquiry found them in many other severe cases, and believes they would be frequently discovered if inquiry were made.

The symptoms supervened gradually, so that there was no time when their beginning could be definitely fixed. There was first a sense of debility, increased on attempts to "walk it off;" and worse after eating, when the abdomen swelled and cold sweat appeared on the face especially; flatulence and disturbed digestion, aggravated by laxatives; difficulty in getting to sleep, from aching of the bones on which the body rested, causing repeated turning, brief relief only ensuing; the slumber disturbed by disjointed, incoherent dreams, reminding one of the fragments of a dissected map; the dreams gradually developing into waking visions, the patient becoming conscious during the dreams, and dissipating them by opening the eyes; objects in the room began to take the shape of faces, leering, and changing into others by the corners of the eyes drawing out; couples of animals marching up to the eyes synchronously with the heartbeats, but vanishing when the eyes opened; dull headache; all these gradually increasing until the debility induced the patient to decide on remaining in bed. This is usually considered the beginning of the attack

but as some will stay up longer than others, it is wiser to date the commencement from the first rise of temperature. When this is done the symptoms will be found to develop with remarkable uniformity.

**First Week:**—In typical cases the fever rises steadily, two degrees each afternoon, and falls one degree each night; the pulse keeps pace with the fever, rising to 100 and 120, full but of low tension, becoming dicrotic, but often not till the second week. The tongue is coated white, tending to become red at the tip and edges, and to assume the small, pointed aspect characteristic of this fever. A strip down the center becomes dry, and later brownish. There is some flatulence, with diarrhea, and tenderness on deep pressure over the ileocecal valve. There is headache, aching of the bones on which the patient rests his weight, some hebetude, perhaps wandering of the mental faculties at night, a certain dullness or sluggishness of intellect. Sometimes there is wild fighting delirium. Slight epistaxis is common. There may be constipation, and some abdominal distress is usual if not universal. Mild bronchial irritation is common, with cough, but little sputa. The stools are offensive. The spleen enlarges towards the end of the week. The premonitory symptoms described continue.

**Second Week:**—The rose spots appear about the eighth day. They are like flea-bites, and the latter have been mistaken for the real typhoid spots. They are rarely numerous, and more frequent on the abdomen, though they may appear anywhere. They disappear on pressure and return. They fade in a few days and others appear. The previous symptoms are worse, the temperature remains high, the pulse becomes dicrotic if it has not done so before and grows weaker; headache is not mentioned by the patient, who grows more stupid and lies quiet. The stripe down the center of the tongue grows dryer and browner. Diarrhea, tympanites and abdominal tenderness are worse. Sordes collect on the teeth if neglected, and the breath is heavy with the odor of decomposition. Toward the end the dicrotism may cease. On the thirteenth day the temperature often takes a turn upward, above any point previously reached, and the succeeding depression is correspondingly lower. Danger from hemorrhage and perforation grows more probable now. Nervous and ataxic symptoms may become prominent.

**Third Week:**—The remissions become deeper, the evening rise becoming likewise less; the pulse softer but still rapid. Debility and emaciation are evident. The mental symptoms clear up in favorable cases, and the appetite may become dangerous. In bad cases the pulse weakens, delirium and muscular tremor occur, or subsultus, muttering, carphologia, the abdominal symptoms increase in severity, and blood with detached

sloughs appears in the stools. There is greater danger of hemorrhage and perforation now, and of pulmonary complications. In ordinary cases the end of this week sees the temperature normal and the patient out of bed.

Severe cases may see even graver states in the fourth and subsequent weeks. Under the expectant plan the writer has known cases run along for thirteen weeks and finally recover. Emaciation and debility reach their highest point in protracted cases. The excretions are discharged involuntarily. Incautiously raising the patient's head may cost his life. Relapses, recrudescences and the train of complications and sequels may appear. But even in the least promising forms improvement may set in at any time, and the patient slowly recover. Convalescence in these forms is slow, and the degeneration of nervous and muscular tissues leaves an impress on the patient that may be permanent. Mental debility and even permanent aberration may testify to the profundity of the alterations made in the cerebral structures. Months and even years may be required to nurse the patient back to such mental and physical health as will allow of his resumption of the burdens of life.

**Analysis of Symptoms:**—The most frequently observed form of the onset has been described. In one of the writer's cases, the patient was seized with wild fighting delirium, requiring several men to restrain him. This was a lusty young German, who recovered after an unusually sthenic attack. Other cases begin with severe headache or neuralgia, meningeal symptoms such as photophobia, twitching muscles, retracted neck and convulsions. In others the stupor is more pronounced, and there are evidences pointing to cerebral effusion.

The pulmonary symptoms may be so prominent that pneumonia, pleurisy or acute tubercular infection may be suspected. Acute toxic gastritis, and appendicitis, have been diagnosed and turned out to be typhoid. Possibly in these the poison has been taken into the stomach in concentrated form. Others present the aspect of acute nephritis, with bloody albuminous urine, casts, oliguria, etc.

In "walking typhoid" the initial symptoms are masked and the patient may continue at his work even into the third week. Such cases have even gone through the whole course unsuspected, and been recognized only after fatal perforation has occurred. In one of the writer's cases, a barber applied for advice for severe hemorrhages after three weeks' illness, with daily work at his trade. In another, a young girl came to the city from a town thirty miles off, and walked the streets for two days seeking admission to a hospital. A third, an Italian missionary, was brought for diagnosis to the hospital by a committee of colleagues. All

three recovered, although as usual in these cases they had unusually severe forms of the malady.

At first the face is flushed, the brows contracted from the headache, but the eyes are dull; and as the disease progresses unchecked the dull, stupid expression grows more marked. The bright eye of other fevers is rare. The blood is poisoned, not destroyed as in malaria.

**Fever:**—The course of the temperature curve in a typical case is characteristic of this malady. During the first week the temperature rises about two degrees each evening and falls a degree each night, so that by the evening of the fifth day it has reached 104.5° F. The daily fluctuations are somewhat less during the second week. Lysis then begins, the morning remissions becoming greater, the evening *âcme* subsiding more slowly. When the attack continues into the third week there is apt to be a somewhat higher temperature than in the second week, of the same character, lysis being postponed till the fourth or some subsequent week.

While all cases do not pursue this unvarying course, there is a similitude to it in most, and the division by weeks is apparent even in prolonged attacks. Any marked variation from the typical course has its meaning; and in these we find our most highly prized prognostic signs. Sudden rises at the outset occur when the infection is intense and the attack begins with a chill or a convulsion. Inverted types have been recorded as curiosities. A rise of a degree or more, especially in the third week, usually indicates an intercurrent pneumonia, which may not be denoted by the usual cough, the patient being too dull. A sudden fall indicates internal hemorrhage even before blood has appeared in the stools. A sudden drop, followed by a rise and abdominal pain radiating from the first point over the abdomen, are typical evidences of perforation. Hyperpyrexia is not common, but may precede death. Abortive cases are becoming quite common as the doctrine of intestinal antiseptics gains credence; the fever subsiding during the first or second week.

During convalescence, imprudences in diet, exertion, or emotion, the visits of irritating friends and similar causes sometimes give rise to returns of fever, of some hours' or days' duration, termed recrudescences. These are not relapses, and have no anatomic lesions behind them. They indicate the extremely mobile state of the heat centers. But their occurrence should lead to the most careful examination, lest they should really indicate pneumonia, acute tubercular infection, extension of intestinal ulcerations, or other grave complications. Even if the symptoms do not reveal it, the blood examination may show a leucocytosis.

Sometimes the evening temperature will continue to rise for a long time without evident cause. The suspicion of tuberculosis arises, and

this should be considered; but quite often it is a mere subjective symptom, and the disuse of medicine, care, and of the thermometer will put a stop to it. In the former case there will be continued emaciation and debility.

Low temperatures are uncommon during the fever, unless the bath treatment is employed. During convalescence they may occur from defective metabolism and the interference with absorption through Peyer's glands, simulating obstruction of the thoracic duct in the effects.

True relapses are not very rare, especially when the case has not been treated antiseptically. There may be reinfection from the gall-bladder. The course resembles the original but is shorter.

Cases have been recognized in which there was no fever.

Sometimes there is an initial chill. Chills followed by free sweating also occur; others herald the advent of pleurisy, pneumonia, otitis, perioritis; occur after acetanilid or from emotional causes; but are usually to be taken as indicating septic invasions, most frequently the entrance of septic material through unhealed intestinal ulcers.

The rose spots have been mentioned. They are elevated slightly. On fading after three days, they leave brownish spots. Sudamina and miliary vesicles follow free sweating. Purpura is unusual. The skin sometimes desquamates. The *taches bleuâtres* formerly described are now ascribed to parasitic insects. Erythema is not uncommon during the first week. The *tache cerebrale* may be readily developed by drawing the nail across the skin; a red line with white borders. Herpes is rare. Gangrene of the skin sometimes occurs with children. The skin is generally dry during the fever, but some cases have free sweating.

Edema may be due to obstruction of vessels (local), to nephritis (general), or to poverty of the blood. The hair often falls after severe attacks, and sometimes the nails. Ridges are developed on the latter, or atrophic ridges mark the parts developed during the fever. The peculiar odor noted on some patients is another evidence of neglect of the toilet of the bowels. Whitish lines may appear on the abdomen and thighs, resembling "mother marks." Bed-sores may form when the patient lies very low, the skin wet by incontinent urine and the nurse neglectful. Cleanliness, relief of parts from too continuous pressure, and stimulating applications, prevent or cure them. Boils are common sequels, especially after the bath treatment. (Osler.)

Thayer, quoted by Osler, describes the following as the blood changes: Little change occurs during the first two weeks. In the third week the red cells and hemoglobin fall, to rise during convalescence. The hemoglobin falls proportionally below the red cells, and rises more slowly.

The white cells are fewer than normal throughout, and the absence of leucocythemia is diagnostic. The large mononuclear and transitional forms are increased, the polynuclear neutrophils much lessened in number. Acute inflammatory complications show an increase in polynuclear forms.

In convalescence the anemia may become extreme.

The pulse is slow as compared with the fever; it is early dicrotic; the arterial pressure is lower as the debility increases, the capillaries relaxing, the skin livid, and extremities cold. As the patient gains strength the pulse becomes normal, except that it is extremely mobile. Bradycardia is more frequent than after any other fever. Osler has found the rate as low as 30.

The heart-sounds may be normal; or the first sound weak, with a soft pulmonary systolic murmur. Gallop rhythm is common; embryocardia present in extreme weakness, the two sounds quite similar, the long pause shortened. Cardiac inflammations present their own evidences. Embolism and thrombosis of arteries are rare, the femoral being most frequently affected. Gangrene results in the area of supply. Venous thrombosis is more common, occurring in the veins of the legs. The phlegmasia subsides as the collateral circulation is established. Gangrene following obstruction of the arteries is of the dry form. When both artery and vein are involved it is moist and rapid in its course.

Anorexia comes first in time, and remains throughout. The thirst is marked at first, but is apt to be masked by the hebetude. The tongue, "small, dry, pointed, red at the tip and edges," is not now considered distinctive; yet it will frequently be seen. In the low stages it is apt to be cracked and ulcerated. With convalescence the coating is thrown off. Salivation is rare; the mouth usually dry. Parotitis may occur in the advanced stages, sometimes ending in suppuration. Pharyngitis is usual, sometimes membranous, which is apt to prove fatal. Esophageal ulcers may occasion dysphagia, and end in stricture. The stomach is generally the seat of mild irritation at first, soon lost in the more serious intestinal malady. Early nausea is not uncommon. Occurring later, it may indicate a serious complication. Diarrhea is not an essential element, and if present is not severe unless unwise medication or feeding is the cause. The stools are not more than five daily. Sometimes constipation is present. When the patient is restored to activity the persistence of diarrhea may indicate unhealed ulcers.

The stools have long been likened to pea-soup; they are alkaline and offensive, yellow or brown. When the sloughs begin to separate blood is to be found in small or large quantities, usually only traces, with the



separated sloughs. Hemorrhage is not usual before the end of the second week, and may occur at any time while the sloughs are separating. It may result from intense hyperemia. It is heralded by a sudden fall in temperature, with a sense of collapse, thready pulse, faintness, etc. Death may occur before the blood is discharged in the stools. It seems to be more frequent when the cold baths have been used enthusiastically.

Flatulence is a discomfort and a danger, the gas pushing up the diaphragm so as to interfere with respiration, and by distending the weakened intestinal walls, favoring perforation. Gurgling and pain on deep pressure in the right iliac fossa are generally present. The location of the pain here has led to operations for appendicitis. Pain may exist at any part of the abdomen where there are reasons for it. The peculiar pain of perforation and the consequent peritonitis has been described. When the ulcerations penetrate the muscular coat, localized peritonitis will cause pain and tenderness.

Perforation may occur in any case, but is more frequent when ulceration has been extensive. It rarely happens before the third week, and may occur at any time until the ulcers are healed, even months after the patient is up. The pain is most frequently on the right side. The bladder may be irritated. The muscles become rigid, with great distress on pressure. Sometimes the temperature falls, the pulse becomes feeble and rapid, cold sweat and other indications of shock are present. As peritonitis develops the leucocytes increase. The symptoms may be masked by profound toxemia. Respiration is hastened, hiccough appears early, and vomiting is frequent. The abdomen may be distended or flat, tympanitic or dull from effusion. Other evidences, if any are needed, may be afforded by the cessation of peristalsis, the presence of air in the peritoneum, the development of friction sounds within twelve hours, disappearance of liver dullness under gas accumulation, and pelvic fullness or tenderness, as revealed by rectal examination. Rapid disappearance of liver dullness with an abdomen not much distended is a valuable sign (Osler).

It may be difficult to make out enlargement of the spleen, which is generally present.

Symptoms referable to the liver are uncommon. There may be jaundice, abscess, inflammation and suppuration of the ducts and gall-bladder, the latter rather frequently. Pain in the gall-bladder is common, with local tenderness and the pear-shaped tumor, with contraction of the rectus, not always jaundice. Gall-stones are a frequent sequel, due to typhoid bacilli penetrating the gall-passages.

Epistaxis is common in the first stages, usually slight, but may be prolonged. Laryngitis, edema of the glottis, necrosis of the laryngeal

cartilages, laryngeal paralysis, emphysema and stenosis, are infrequent occurrences. Bronchitis at first is almost a matter of course. Both catarrhal and croupous pneumonia occur. The latter may herald the onset of the disease, beginning with the traditional chill, the symptoms of typhoid developing later and possibly masked by the pulmonary malady. But it is in the later stages when the danger of pneumonia becomes greatest, when the patient is so stupid that the pulmonary affection may be overlooked unless the physician is on his guard. There may be no cough, no complaint, only an increase in the fever, with shallow or slightly hurried respiration, and an increase in the hebetude, the tongue dryer and browner, the pulse weaker and faster. Dullness may even be recognized and attributed to the hypostatic congestion also present, unless examinations are made after the position has been changed and sufficient time elapsed to allow the serum to drain from the uppermost lung. Sometimes the patient may by sharp commands be induced to raise a little "brick-dust" sputa "from the bottom of his lungs."

Hypostatic congestion may be recognized by serous rales, dullness, disappearing or changing with change of posture, and shallow breathing. Fatal hemoptysis has occurred. Pleurisy is perhaps more common than is suspected. Pneumothorax has also been observed.

It is difficult to distinguish between the cerebrospinal form and true meningitis, except by lumbar puncture and Kernig's sign. Delirium is less frequent under hydrotherapy, and absent under efficient antiseptics. It may be noisy at the start, but is generally quiet, muttering, apparent at night mostly, rarely maniacal. Sometimes it is sly, and the patient may escape and wander off if not watched. Alcoholic cases exhibit the features of alcoholic delirium. Usually the patient may be recalled to his senses by sharp questioning; but in bad cases he sinks into a profound stupor, in which he lies with eyes open, muttering or quiet, passing stools and urine in bed, constantly picking at the bed-clothes, the lips and tongue tremulous, the lower jaw fallen, opening the mouth, the tendons of fingers and wrists twitching. This state, which is neither waking nor sleeping, is known as coma vigil. The patient may lie on his back snoring, and yet be not asleep. Nothing is asked, as the patient feels nothing. He may need water badly, and a careless nurse may neglect to give it. The bladder may fill up, and incontinence of retention occur, the careless doctor neglecting to ask about it. Bed-sores are apt to form in this period, and if the nervous system is profoundly implicated the tissues may break down with inconceivable rapidity. The condition is one of great danger.

Children may begin an attack with a convulsion, but this is rare in typhoid, unless complicated with acute cerebral inflammations or thrombi.

Neuritis of the arm or leg may occur, with great pain and swelling. Muscles become sore, especially the calf, with cramps. The heel has been known to necrose when too steady pressure is made upon it. This may be avoided and comfort secured by placing a pillow under the knees. Handford speaks of tenderness of the toes, especially after cold baths. Multiple neuritis has appeared during convalescence. Poliomyelitis, hemiplegia, tetany and aphasia, are rare accompaniments. Insanity of various types has occurred as a sequel, usually temporary.

Among occasional complications may be mentioned ocular disturbances and inflammations, pareses, hemorrhages, cataract and orbital thromboses; otitis media may be the cause of a rise in fever. It is not usually serious unless neglected.

Retention of urine may occur at any time, but is more usual in the stupid stage. The urine is scanty and concentrated, depending much on the quantity of fluids given, and on the sweating.

**Ehrlich's Diazo-reaction:**—Make a solution of hydrochloric acid, 50 cc. to 1000 cc.; and saturate it with sulphanilic acid. Also make a one-half per cent solution of sodium nitrite. In a small test tube mix equal quantities of the urine and of a mixture of equal parts of these two solutions freshly combined, and shake well. One cc. of ammonia is then trickled carefully in so as to rest on top of the preceding mixture, when if the reaction presents itself there may be seen a deep brownish-red ring at the junction. Normal urine gives a light brown with no trace of red. If the diazo-reaction is present the color of the foam when the mixture is shaken, and the tint when largely diluted with water, are a delicate rose-red.

This reaction is present in about two-thirds of the cases, and may be demonstrated during the first week and up to the twenty-second day. It occurs also in malarial fevers, tuberculosis, and sometimes in other acute affections with high fever.

Typhoid bacilli are found in the urine of about one-third of the cases, rendering it turbid, and causing a peculiar shimmer in the test tube specimens. They have been found in the urine for years after an attack.

The urotoxic coefficient is high, and higher when baths are employed.

Renal complications consist of albuminuria, of diagnostic value but not ominous; acute nephritis with higher fever, scanty bloody urine and back pain; nephritis in convalescence with anemia and edema; lymphomatous nephritis without symptoms; pyuria from typhoid and colon bacilli, or cocci; pyelitis, single or double, during convalescence.

In the genital apparatus we occasionally meet orchitis, acute mastitis or hydrocele. Bone lesions are common and troublesome, such as periost-

titis, necrosis and caries, chronic in course and recurrent. Arthritis is rare. Spontaneous dislocations of the hip have been recorded. Gibney describes the "typhoid spine," with pain in the lumbar and sacral regions, stiffness, pain on motion and tenderness but no increase of fever. The prognosis is good.

Slight fevers ruffle the course of convalescence, possibly septic, probably autotoxemic. Pyemia occurs, with numerous boils, fever and leucocytosis; or multiple chronic abscesses, or septic embolisms, or suppurating mesenteric glands, splenic infarctions, parotid suppuration, pus formations, perinephric or perirectal, arthritic or osseous.

Other diseases that sometimes complicate typhoid fever are erysipelas, measles, varicella, noma, diphtheria and acute rheumatism. Malaria is a disputed proposition. The physicians of malarial districts believe in the association, those who reside in northern cities are skeptical. Typhoid and tuberculosis coexist, are mutually mistaken, and the latter sometimes manifests itself during convalescence.

Epilepsy, chorea and diabetes are suspended during the course of typhoid.

Numerous forms of typhoid fever have been described, as it is modified by local and epidemic influences. Some attacks seem to expend their force on the brain, others on the lungs, the kidneys and other organs. Murchison describes the abortive, grave and latent varieties. In milder forms the symptoms are less severe, though similar; the temperature does not rise above 103° F.; the abdominal symptoms are not marked; and the patient is restored to health in ten to fourteen days. Abortive cases run their course in two weeks or less, the fever falling by crisis. Relapses may occur.

In the grave form the fever is high, nervous symptoms prominent, depression marked and the course prolonged. Pulmonary and other complications occur.

In the latent form, or walking typhoid, the symptoms are light, there is little digestive difficulty, and the patient may remain at work for nearly the entire term of the fever. Hemorrhage, perforation or sudden delirium, may first call attention to the affection.

In the afebrile form patients show debility, depression, anorexia, headache, slow pulse, perhaps rose spots and enlarged spleen, but no fever.

Children at any age are liable to typhoid fever. The fever rises more rapidly, the cough is more troublesome, and the nervous symptoms are more prominent. Delirium and insomnia are more common than intestinal disturbances. Serious hemorrhages and perforations are unusual,

but aphasia, noma and affections of the bones are more frequent. The malady generally runs a mild and favorable course. Abortive forms are common.

In the aged, typhoid fever is less common, but more fatal. Pulmonary complications and heart-failure are to be dreaded.

Pregnant women are liable to typhoid, and about two-thirds abort. This is especially apt to occur in the second week. It is claimed that the fetus *in utero* may be affected, but not necessarily. The Widal reaction has been obtained from the blood of the fetus and from the nursing.

Relapses occur in from 3 to 18 per cent. They may be ordinary, coming after complete defervescence; or intercurrent, causing unusually protracted attacks; and spurious, commonly termed recrudescences. Immunity is slow in being established, and typhoid bacilli are found in the stools for years after an attack. Are they domesticated there, and reproduced?

**Diagnosis:**—Typhoid fever is quite common, exceedingly variable, does not hybridize with malaria, and while easily diagnosed in typical cases, is difficult or impossible in others. In typical cases we have the peculiarly uncertain onset, epistaxis, bronchial catarrh, digestive irritation, and the regular ascent of the temperature. The singular symptoms of the incubation period described may occur in other septic infections. The dicrotic pulse is suggestive. The rash does not appear until the diagnosis has been as a rule established by other evidence, and is confirmatory. Tenderness and gurgling in the right iliac fossa are significant but not exclusive. Enlarged spleen occurs in other continued fevers. The absence of leucocytosis is strong evidence, and the presence of Ehrlich's reaction confirmatory.

With the majority of the above present, while not absolutely conclusive, we may ask: If not typhoid, what is it? And the weight of probability is so strong that we have a right to demand positive evidence to show the contrary.

Positive proof is afforded by isolation of the typhoid bacillus from the blood, which can be done quite early; or from the stools, which is more difficult; or from the urine, which is easier, and may be done in the early stages; or from the rose spots, which is painful and possesses no advantages.

**Agglutination:**—With an aseptic needle prick the aseptic lobe of the patient's ear, and obtain a drop of blood on a clean glass slide. Place a loop of bouillon culture from typhoid bacilli on a clean cover-glass and to this add a large loopful of a watery solution (1 to 50) of the dried blood specimen. Invert the cover-glass over the concavity of a hollow slide,

and seal the edges with melted vaselin. Under a dry lens of high power, or an oil immersion twelfth, a rapid clumping of the bacilli in the hanging drop may be observed, and their movements cease almost immediately.

The objection to the Widal method is that it may not be manifest till too late to be of practical value as directing the treatment. But it gives material aid in confirming the diagnosis, and convincing those who doubt the authenticity of every case which is aborted.

Attacks localized in the cerebrum and spine are apt to be mistaken for meningitis. Examination of serum obtained by lumbar puncture clears up the obscurity. Cases beginning with symptoms of pneumonia, or early involvement of the pleura or kidneys, may likewise be differentiated by the bacteriologic investigation.

Typhoid and malaria rarely coexist in the north. Each may take on the similitude of the other. Examination of the blood affords the only sure diagnosis. The more pronounced fluctuations of the fever, with the history of exposure to malaria, suggest the latter.

Pyemia may resemble typhoid, but the chills and great variations in the temperature during a single day, with decided leucocytosis, indicate the former. Ulcerative endocarditis also presents an increase in the leucocytes. Tubercular maladies are distinguished by their bacilli, and the rapid emaciation. That repeatedly cases of typhoid fever have been operated upon as appendicitis, even in Johns Hopkins Hospital, shows how difficult the diagnosis may be. The presence of leucocytosis, and the absence of distinctive typhoid symptoms, usually serve to prevent this mistake.

It must be exceedingly difficult to distinguish true second attacks of typhoid, since patients may have the bacilli in their stools for years after a first attack. If then they are seized with any of the above maladies, and typhoid bacilli are found in the blood or the urine, or stools, how are we to tell if it be a second attack or not?

**Prognosis:**—The mortality varies in different epidemics. It is less in private than in hospital practice. Five per cent is very low; 20 per cent nearly as bad as is ever now reported. Osler's 829 cases gave a death rate of 7.5 per cent. In the Spanish-American war the mortality was 7 per cent.

Bad indications are very high fever, marked toxemia, delirium, abdominal distention, hemorrhage, great or diffuse tenderness; or great depression with marked involvement of the nervous system, especially the symptoms pointing to that nervous collapse termed the ataxic state, one indication of which is dilatation of the pupils. Walking cases are dangerous; fat people bear the disease badly; women are more apt to die than men;

pregnancy is malefic; organic disease of the heart or other vital organs adds to the gravity. But the worst prognostic is the habitual use of malt liquors by the patient. In such cases the heart is apt to fail just when its endurance is most needed. In the period of greatest depression sudden death has resulted from incautious elevation of the head. In convalescence perforation has ensued after indulgence in solid food, though this danger has been exaggerated. Perhaps one of the chief elements in the prognosis is the physician's recognition of the dangers of toxemia, and its main source in the alimentary canal. The hygienic conditions of the house and its surroundings influence in the most decided manner the severity of the case and its course to recovery or to death.

**Prophylaxis:**—If the typhoid bacilli given off in the urine and feces of each patient were destroyed, or if they found no entrance into the drinking water or food, or any suitable soil for their development and propagation, there would soon be no more typhoid fever, the germs having become extinct through the working of natural causes.

As a disinfectant and germicide lime has been proved effective. It is cheap, safe, easy to procure, and anybody can use it. Neither lime nor any other germicide acts instantaneously. Time must be allowed for the fecal masses to be permeated, and the bacilli to be destroyed. Use a large surplus, to make sure. Let the discharges be passed into vessels containing several quarts of freshly mixed whitewash, and after covering the vessel let it stand for an hour before emptying it.

See personally that the house and vicinity are put in perfect sanitary condition. We have no words in our vocabulary strong enough to express our contempt for the so-called physician who attempts to treat a case of infectious disease like typhoid fever, and never gives a thought to the domestic hygiene. See that cellar, yard, alleys, adjoining lots, gutters and street, as well as cesspools, are cleared of all organic matters that may afford a nesting place for morbid germs. Empty and disinfect offensive cesspools. Open up wet cellars to the sun and air. Especially, if there is a well on the place in use, see if there is surface drainage into it. A good day's work may be done in attending to these matters. In the city the house drainage must be seen to. Especially important is it to exclude the stationary washstand from the sickroom. Thorough cleanliness, constant and abundant ventilation, are more important even than drugs or diet.

Place the patient in an isolated room, capable of free ventilation, and put a nurse in charge who will exclude unneeded persons rigidly. Have a tub of water containing some efficient disinfectant, in which all linen may be soaked before taking it from the room. Another vessel should

be employed for dishes. Phenol, one part to 20 of water, or chloride of lime, will answer well. Linen should be soaked for two hours; dishes need simple rinsing. Food fragments should be treated as the discharges, to insure their not being eaten by children. A qualified nurse will see that her hands are disinfected after handling the patient, and especially after touching the discharges.

During epidemics every means should be taken to prevent the use of possibly infected drinking water, milk, oysters, fruit exposed to street dust, etc. Camps should be laid out so as to avoid infection of the water supply and the campers instructed in the dangers and means of avoiding them. Feces and urine should be well covered with earth as soon as dejected so as to prevent the contact of flies. Boiling the drinking water is surer and pleasanter than the addition of any chemical disinfectant. But the use of a tinge of permanganate of potassium is to be commended.

The evidence is favorable as to the efficacy of Wright's prophylactic serum. The injections cause local irritation, faintness, fever and uneasiness.

A. F. Wright reported favorably on his experience with many thousands of antityphoid inoculations in the British army, finding the incidence lessened one-half in the inoculated, and the mortality of those attacked more than 50 per cent less than of the uninoculated. Protection endures between two and three years. Chantemesse reported the mortality in 756 cases treated with his typhoid antitoxin as only 4 per cent, compared with an average mortality in other Paris hospitals of 18 per cent, and a minimum of 12.8 per cent. Einhorn also favors the serum.

**Treatment:**—The objections to the intestinal antiseptic method may be thus reduced to logical terms:

All the phenomena encountered during a case of typhoid fever are due to the typhoid bacilli.

These bacilli, even in the incubative period, may be found in the blood and beyond the reach of intestinal antiseptics.

Therefore these agents are useless.

Also:—Unless every microorganism in the alimentary canal is destroyed by antiseptics they are useless.

The antiseptics will not destroy every microorganism in the alimentary canal.

These agents are therefore useless.

In both formulas the major premise has not only never been proved but is absurd on its face. Yet on these the condemnation of the antiseptic method has been based. The technic of this method and the reasons for its advocacy are detailed in the introductory chapter on the treatment of fevers.



Not all cases pursue an eminently satisfactory course under the antiseptic method; but the severe forms become scarce, the abortive cases frequent, and the disease puts on a milder aspect. If the neighboring physicians continue meeting bad forms, the object-lesson becomes impressive.

The sooner the antiseptic method is put in practice, the more decidedly will its good effects be manifested. If the case is not treated until ulceration has occurred, or until the patient's condition is desperate, and the believer in antiseptics is then called on to demonstrate his miracles, failure is probable. The sulphocarbolates will usually prevent the dangerous conditions of the third week, but there are better remedies to promote the healing of ulcers, prevent perforation and stop hemorrhage; also to combat pneumonia.

But when the sulphocarbolates have been given early in the attack, in the manner described, there is little to be apprehended in the way of complications and sequels.

When ulceration has taken place and grave symptoms are present in the third week, the oil of turpentine has long enjoyed a well-deserved reputation. Give five drops every two to four hours, in capsule or egg emulsion. Tympanites quickly subsides, the tongue becomes moist and loses its brown central stripe, and the stools become healthier. This remedy combines the effects of an antiseptic with a stimulant which promotes healing.

Hemorrhage is best met by ice to the abdomen, and silver nitrate, a grain a day, in divided doses. Sudden and dangerous bleeding is controlled more quickly by atropine, gr. 1-67, hypodermically, the dose being repeated so as to keep the blood in the skin and out of harm's way. Turpentine should be begun whenever there is a trace of blood in the stools, or the sloughs appear in them.

Threatened perforation is averted by turpentine. If it occurs the abdomen should be promptly opened and the diseased gut resected. But an aseptic bowel will not break, and will not be dangerously distended.

Diarrhea never requires treatment beyond zinc sulphocarbolate and bismuth.

Constipation is best relieved by the occasional use of calomel and salines as suggested, and colonic flushing.

The nervous phenomena are inconsequent under the zinc treatment. Restlessness, etc., is almost always an indication of imperfect intestinal antiseptics, or of bad nursing, unwholesome visitors, improper food, etc. But a few small doses of zinc or caffeine valerianate will often give great relief, seemingly out of proportion to the powers of the remedy (gr. 1-6 every hour).

Bed-sores are prevented by placing the patient on a woven wire frame without a mattress but a couple of blankets over the wires. This gives a cool and well-ventilated bed, into which the patient will sink as in a hammock and the weight be evenly distributed. Absolute cleanliness is required, and urine especially must be washed away and the skin dried at once. If the skin reddens it should be rubbed with alcohol, with a little camphor added.

Dilatation of the pupils and other evidences of ataxia call for zinc or caffeine valerianate, a grain of either every two to four hours; or for some other of the antispasmodic group. Musk was the ancient remedy.

The diet usually preferred is milk; but for many years this has been avoided by the writer. The raw white of egg, dissolved in ice-water, is the one food which does not require digestion, being directly absorbed into the chick without passing through a digestive system. In fact, if the intestinal glands are universally affected it is difficult to see how any other food can be utilized, the patient being precisely in the condition of one whose thoracic duct is obstructed. The white of an egg may be given every two to four hours. The writer usually gives it every four hours, and half way between these doses gives four ounces of coffee made with milk, or rich with cream, or of freshly pressed grape or other fruit juice. Sometimes use is made of the predigested foods. Plenty of water must be prescribed in regular doses, as the patient is not apt to ask for it, and the inexperienced nurse will forget it.

If more nourishment is needed, bovine may be given as freely as the patient can manage it—a tea- to a tablespoonful every two to four hours.

The writer has never seen any benefit from the use of any form of alcohol; and has not given it in typhoid fever for many years.

The mouth should be frequently washed out with cool water, to which is added some pleasant, non-toxic antiseptic. The aromatics offer suitable agents.

Serum therapy has not as yet scored a success in typhoid. Possibly in time it may develop so as to give results approaching those of effective antiseptics.

Many other intestinal antiseptics have been recommended. Illingsworth advised mercury biniodide, Novy acetozone, Kesteven eucalyptus, etc. The results they report show the possibility of valuable effects from these agents. The writer has not obtained as good effects from any others as he has from the sulphocarbolates.

**Convalescence:**—Dangers multiply as the patient begins to improve, to feel an appetite, and to take charge of himself. The judgment is often wabbly, and strange fancies disturb him. The writer well remembers

that during his convalescence his fixed purpose was to prosecute for malpractice the faithful physicians whose skill and devotion had brought him through.

New foods should be added slowly and singly, and their effects watched. Over-eating, the too-speedy allowance of solid food, over-exercise, disturbing and unwise visitors, are to be avoided. The best tonics are the digestants, with mild chalybeates, the natural waters especially. Zinc oxide is a good remedy to promote healing and dissipate gastric catarrh. Berberine restores tone to the relaxed intestinal walls; a grain a day in divided doses is the average dose. Rest, quiet, passive exercise and massage, with change of scene, salt air and bathing, are useful, especially when the enfeebled mental faculties render a speedy return to business cares inadvisable. Complete restoration from very severe attacks may never take place.

Control of the case should be retained by the physician as long as there is an unhealed ulcer. The remedies for this condition should be changed each week. Turpentine, silver oxide or nitrate, euophen and zinc oxide, may be usefully alternated, each being given up to the limit of tolerance. The intestinal antiseptics are usually required till the patient is able to take a full allowance of exercise.

One of the singular features of typhoid fever is the absence of leucocytosis. If this depends on the general implication of Peyer's glands, it indicates the possibility of these structures being participants in the elaboration of the leucocytes.

The writer has to go back to the years before he learned to use antiseptics, to recall the various accidents and incidents figuring in his severe typhoids; and so he has neglected to speak of some of them. Hypostatic congestion calls for frequent changes of position, that no part of the lung may be unduly weakened by too-long soaking in the exuded serum. Add the use of sanguinarine, gr. 1-20, every two to four hours, to increase the vitality of the pulmonary tissues. The same remedy is useful in typhoid pneumonia, with stimulant liniments and good feeding.

The heart must be especially watched in aged subjects, but tonics must be given judiciously, or reserved till the need is manifest. In persons over sixty, the use of moderate doses of digitalin or strychnine may forestall heart-failure, while its excessive use might exhaust the susceptibility and hasten the danger. But persons habitually accustomed to alcohol should be stimulated from the first, and strychnine may be required in very large doses.

The results of the treatment herein advocated are most satisfactory. Self-advocacy would seem to be prominent were the writer to state his

experiences, and he will content himself with the recommendation to his professional brethren, that they try the methods and judge for themselves. He gladly accepts the American physician as a jury.

Burggraeve began his treatment by washing out the alimentary canal with effervescent magnesium sulphate. It seems singular that those who fully appreciate the importance of good hygienic surroundings, and the dangers of allowing collections of putrescible organic matter to remain in the patient's vicinity, should overlook the possibilities resulting from quantities of the deadliest infective material actually within the patient's body and being absorbed into his blood.

He followed with strychnine and quinine arsenates, for the adynamia and prostration, one or two granules each, every half-hour, as long as the fever oscillated between 102 and 104° F. When the fever tended to become continuous he had recourse to aconitine, veratrine and digitalin; watching for complications, with emollients, revellents and dry cups where needed. Agitation, insomnia, trembling, etc., should be quieted with morphine, hyoscyamine, strychnine, cicutine, etc. When the pulse and temperature had been brought to nearly normal, he gave quinine hydroferrocyanate as a febrifuge and reconstructant, three or four granules every half to one hour.

To keep the digestion in good condition he gave also quassin and soda arsenate, one or two granules every hour.

Under this treatment the venerable Father of Dosimetry claimed these results: "Vainly have our opponents attempted to show that our diagnosis of the patients cured was incorrect; we have jugulated too many cases for that; our diagnosis could not always be wrong; and if we have jugulated some of them, why may we not have also jugulated the others?"

D'Artigues writes in *La Dosimetrie* of some cases of typhoid fever, selecting, as he says, "the gravest among the gravest," for his illustrations, those in which the dosimetric treatment was only instituted when the patient was *in extremis*. "The first was the daughter of a physician, 'allopath,' aged sixteen years. In the midst of an epidemic she was seized with typhoid fever, with the gravest ataxio-adyamic phenomena. Delirium was constant, fever of extreme intensity, diarrhea alternated with constipation. The usual remedies had been employed, including quinine; and the two consultants had retired from the case as hopeless. The father, alone, desperate, recalled the advice of D'Artigues, and decided despite his skepticism to employ the alkaloids dosimetrically. Following the directions of Toussaint's *Medicine simpliste* (the French equivalent of Abbott's Alkaloidal Digest), considerable improvement was manifested, and the girl opened her eyes, the first time in eight days. The



intensity of the fever had much diminished, and when the two consultants returned the next day they were amazed at the change. The child recovered completely. Such facts, which can not be attributed to a lucky chance, must shake the most deeply rooted prejudices. But, as further proof, we have even interrupted the dosimetric treatment at the moment when a striking improvement had been produced, and after a very short interruption have seen reappear the whole series of primitive symptoms, including the elevation of temperature.

"At other times we have seen an elevation more or less marked of the fever, and a light exacerbation of other symptoms, follow some slight diminution of the granules, and *vice versa*. Just so the surgeon, controlling the flow of blood through a severed artery, may by raising or dropping his finger cause the jet of blood to appear or to cease.

"The muscular debility that characterizes this malady extends to the heart muscle and the muscular arterial coats as well; and weakening the circulation causes liability to congestions. The lungs receiving all the blood from the right heart are especially liable to this congestion; but in all the other organs this enfeebling has this effect. The red globules coming less frequently to the lung, are less often aerated; hence the characteristic asphyxia, evident in grave cases and in advanced stages, but beginning as soon as the force of the circulation is diminished. This latent asphyxia is apt to become manifest when the prodromic stage dawns and general lassitude is felt. This should direct attention to the weakness of the heart and arterial walls, invisible as yet, but which can not fail to cause cerebral and other troubles which are perfectly evident. The blood, no longer restrained by the normal tone of its vessels, obeys the law of gravitation and settles toward the more dependent parts. Hence the vertigo, darkening of vision (*eblouissement*) and pallor when erect; abdominal congestion and tendency to hypostasis. The vascular pressure diminishes as muscular debility increases. Thence the acceleration and dicrotism of the pulse, the alteration of the red cells in all the organs, and their lessened oxygenation; then a sort of autointoxication by these altered globules, increasing the muscular weakness and causing disorders the more severe as the number of the abnormal cells is greater—that is, in plethoric subjects—a point confirmed by clinical observation. As the pressure falls the pulse accelerates and yet the velocity of the blood current diminishes, from feebleness of the cardiac impulse. We insist particularly on this last proposition, as it is vital to the question we are discussing, and the contrary opinion has been almost universally accepted as true without examination. This forms the keystone of the study of the lesions and

symptoms of this malady. If the theory has a fault it is that it is too easy and simple. It seems difficult to admit that in all the entanglement of morbid phenomena of this fever there is no mechanism more complicated. (Note:—The French, the most careless of civilized nations as to hygiene, have not as yet begun to recognize the vast importance of intestinal sepsis and antiseptics in this malady.) If then there exists an agent capable of dissipating congestion in any organ, it should also dissipate it in all other organs. Whatever this agent may be, it can cause to disappear at least momentarily the varied troubles that depend on these congestions. An agent endowed with an excitomotor power more marked than others can modify even profoundly the course of the malady, if administered in doses appropriate to each case and with perseverance until the muscular system has had time to resume its own proper energies.

“But whence comes this muscular enfeeblement? It is today universally attributed to the microbe in the blood. As to the mechanism by which it alters so profoundly the muscular system, that is far from being elucidated. It is doubtless possible that the typhoid or typhogenous poison alters the muscular fibers only through the intermediation of the nerves that animate them. If we admit by preference a direct action of the poison upon the muscular fibers, it is only to render the hypothesis easier to seize. But we must admit our inability to decide between these views. Nor do we know whether quinine, cold water, the alkaloids or phenol reestablish contraction of the muscle fibers by direct action or by affecting their motor nerves. But whether the action is direct or indirect, it is no less certain that it occurs; that the contractility of all the muscles of the body is notably enfeebled in typhoid fever, and that this inevitably produces the troubles of circulation and nutrition we have mentioned, and which everyone knows; troubles which constitute in themselves the entire syndrome of typhoid.

“Are there among the remedies employed, ‘allopathically,’ any endowed with such properties as will enable us to presume, in the absence of demonstration, that they can fulfill the above indications? May one be substituted for another, or do they constitute a hierarchy in which one is preferable? Can these medicaments act on the muscular contractility, either by augmenting it when normal, or by restoring it when impaired?

“Quinine causes fibrillary tremors when administered in massive doses; under the influence of cold water the unstriated cutaneous fibers contract, the skin showing gooseflesh; and phenol in toxic doses causes very violent tonic convulsions. These are then excitomotors and fulfill the indication that dominates in the whole course of typhoid fever, as the alkaloids fulfill it. The question is as to the relative value of each,

the real utility and the facility of application. Take an equal number of extremely dangerous cases, treated by the methods we may term allopathic, and by the dosimetric methods. We have made this comparison many times, and declare, without the least hesitation, that the neurosthenic alkaloids enjoy a very great superiority over the other medicaments. Quinine is useful in grave cases, where it lowers the fever, but it does not appreciably abridge the course even in medium cases, and is absolutely impotent in very grave cases, in any dose. But within twenty-four hours, after administering the alkaloids, varied in accordance with the symptoms, opiate against spasm, hyoscyamine, aconitine, cicutine, when indicated—and quinine when exacerbations and remissions occur—the whole formidable cortege of symptoms, if they do not disappear, at least exhibit a change the most favorable and altogether unexpected when not so treated. What astonishes one is that the alkaloids dosimetrically administered can lower to a notable degree the gravity of the attack, abridge the duration of grave cases, abort benign ones, and even prevent the development of the disease in the prodromal period.

“One can only deny *a priori* that which contradicts a fact already proved; but what is contradicted in admitting that typhoid can be modified in its course by means differing from those previously employed without success? What is needed to rescue the typhic from the grasp of his malady? Always and always, contractile force. What then so strange that a little force in the outset has a better effect on the organism than a great development of that force at a more-advanced period? What is needed to extinguish a fire? Water. What at the beginning? A little water. What when the fire has gained headway? Much water; and later, all the water of the ocean will not suffice but to save the remains of the burned building.

“We do not advise the alkaloids exclusively in treating typhoid. We prefer them as permitting more scientific treatment than other remedies; but we combat the saburral state by copious and repeated intestinal lavages; we jugulate the fever by the dosimetric triad (aconitine, digitalin and strychnine arsenate); assure intestinal antiseptis and prevent fecal absorption; and we sustain the patient's forces at all periods of the disease. Quinine acts only in solution and is powerless in very grave cases, it is excessively bitter and difficult to give to children and many others, and it is too costly for the poor. The alkaloids on the contrary are prompt even in very grave cases, they are most easy of administration and acceptable to the most recalcitrant patients; nothing is easier than to vary the doses according to effects obtained, and they are within the reach of any purse. The efficacy of cold baths is incontestable; their application

presents the greatest difficulties in private practice, they require incessant supervision, and expose to the danger of brusque chilling that may induce pulmonary congestions. Phenol we have never employed; it is difficult to take by the mouth and should be used in enemas; it is then almost impossible to judge of the quantity absorbed, but part escapes in the stools. For these reasons the alkaloids seem to us to merit the preference in typhoid fever."

### PARATYPHOID FEVER

The study of the typhoid group has revealed the presence of fevers closely resembling true typhoid, but differing in that they do not respond to the Widal test. From these a bacillus has been isolated which gives a prompt reaction with the diluted blood of the patient but not with that of those suffering with true typhoid which reacts to the Widal.

The new bacillus belongs to the colon group, is motile, has flagella; does not liquefy gelatin, differs from the colon bacillus in not coagulating milk, fermenting glucose, and producing alkali in the culture media. (Meltzer, *Med. Record*).

Close relations exist between this organism and a group of bacilli isolated from beef that caused epidemic poisoning in Germany.

The disease has been recognized as forming a small part of typhoid epidemics in several countries, about 8 per cent of the cases being paratyphoid. No special predisposition has been ascertained, as to age, sex, etc.

As compared with true typhoid, the incubation of paratyphoid is brief; the attack is abrupt. It begins with malaise, dullness and apathy, severe headache, diarrhea at first, followed by mild constipation, and fever rising rather rapidly to 104°. The slow pulse, enlargement of the spleen, rose spots, bronchial irritation, diazo reaction, epistaxis, intestinal hemorrhages, and in one case an osteomyelitic abscess developing as a sequel, show the close resemblance to the history of typhoid fever. Nausea and vomiting are sometimes early manifestations (French).

Sometimes chilly sensations and abdominal pains are early symptoms. A dull flush appears over the malar bones. The tongue is coated, sometimes dry, sordes appear, the abdomen is distended and tender, and boils and abscesses may form. There are no special blood changes or leucocytosis.

The course is irregular, ending by lysis or by crisis, with short convalescence. Relapses are rare, complications common. The prognosis is better than that of true typhoid, and very seldom has a recognized case proved fatal.



The diagnosis is difficult, because some cases are probably multiple, the Widal reaction showing the presence of typhoid, but examination of the blood, feces and urine disclosing the presence of the paratyphoid bacillus also.

The treatment is that of typhoid fever. Meltzer unintentionally furnishes the following strong argument in favor of the use of intestinal antiseptics: "All will agree that the presence of a few typhoid bacilli in the intestines will not always cause typhoid fever. It has been shown that the intestines of the normal human being contain sometimes typhoid bacilli, and probably contain often enough some paratyphoid bacilli. If these are small in number and not very virulent, they will probably bring no harm to their host, and sooner or later will perish by the overgrowth of the saprophytic inhabitants of the intestine. And even if some of their number succeed in penetrating the epithelial layer and entering the circulation, they will meet there their destruction from the bactericidal forces normally present in the blood."

From this we see that the clinical advantages accruing from the use of the intestinal antiseptics are fully explicable on the latest and most approved conclusions of the laboratory.

It is to the interest of accuracy in diagnosis that these cases shall be recognized, even if the treatment is practically identical; especially since there seems to be a strong temptation to utilize paratyphoid fever as a means of explaining away such aborted typhoids as the clinician can not be otherwise "bluffed" out of. Usually the assumption is purely gratuitous, there being no attempt to demonstrate its verity. But even if these abortive cases were shown to be paratyphoid we would have the added difficulty of explaining why one disease produced by a member of so closely allied a group of microorganisms should be abortable, and maladies caused by other members be incapable of similar modification.

The more we study nature, the less disposed we are to draw hard and fast lines, or to say that things "can not be." Typical cases shade off at the margins into atypical, and we finally come to those which simply can not be certainly classified on either side. Positive assertion usually indicates moderate knowledge and limited exercise of reasoning faculties.

## ROCKY MOUNTAIN SPOTTED FEVER

This fever has been found prevailing in several sections of the mountain country, in western Montana, Idaho, Nevada and Wyoming. The limits of latitude are the 40th and 47th parallels; of elevation 3,000 and 4,000 feet. It is a disease of spring and early summer, and affects per-

## MOUNTAIN FEVER

sons much in the open air. Males are therefore most affected, and adults, but occasionally an infant is seized, or an aged man.

Anderson, from whose investigations our knowledge is mainly derived, traced the malady to a parasite, the *Pyroplasma hominis*, closely resembling that causing Texas fever in cattle. It is found in the red blood corpuscles, and is transmitted to man by the bite of ticks infesting this region.

The incubation lasts a week, more or less. Malaise and chilliness may be felt part of this time. The attack commences with a chill, followed by fever of continuous type with slight morning remissions, reaching in fatal cases  $104^{\circ}$  to  $106^{\circ}$  F. The course extends from eight to fourteen days. The decline is gradual. There is pain in the back, loins and muscles, difficulty on attempting to move the limbs, epistaxis during the second week, the tongue heavily coated at the center and base while its edges and tip are red. Nausea, vomiting and constipation are the rule. The eyes redden, becoming yellowish later. The urine is scanty, red, containing albumin and casts. Respirations are increased to 30 or even 60 per minute and bronchitis may develop during the first week. The pulse is weak and faster than the fever would indicate. The liver and spleen enlarge. The pupils react normally, the mind is clear.

A characteristic eruption appears on the third or fourth day on the wrists and ankles, spreading to the arms, legs, forehead, back, chest and abdomen, in the order named. The spots are bright red, up to the size of a pea, becoming dark or like petechiæ in grave cases; they commence to fade near the end of the first week and gradually disappear by the end of the attack.

Many red blood cells are destroyed during the attack, the white cells increasing slightly, the hemoglobin falling to 50 per cent.

The diagnosis involves the discrimination of cerebrospinal meningitis, typhoid fever, purpura, and peliosis rheumatica. The prognosis is grave, the mortality in some districts reaching 90 per cent. Death occurs during the third week, sometimes from complications such as pneumonia.

No distinctive treatment has been devised. Anderson advised quinine hydrochlorate hypodermically. The general principles of fever treatment should be applied, and the symptoms met as they are presented.

## MOUNTAIN FEVER

When residents of lower districts first betake themselves to elevated regions they are apt to suffer from a train of symptoms to which the above designation has been affixed. The first symptom is usually vertigo,

with quickening of the pulse, some difficulty in respiration, a sense of fullness or oppression in the chest, swimming sensations, often nausea or vomiting, headache, and moderate fever, the temperature reaching about 100° F. Thirst is marked, the appetite lost. These symptoms are apt to be aggravated by apprehension and may be distressing. Debility is manifested whenever the patient attempts such physical exercise as was easy in the lower levels. Epistaxis is not uncommon, and bronchial hemorrhages sometimes occur. The nervous unrest may increase and become serious enough to compel the patient to return to the former home. This is especially the case with women. In two cases the writer has known progressive paralysis to supervene, resulting in death even after descent to low lands. It is true, the disease may have been implanted before ascending to the hills, but both patients attributed the malady to that cause.

Milder forms subside if the patient is restricted from overexertion and reassured. Oxygen inhalations may give immediate but temporary relief. The milder, non-tensile heart-tonics are useful, such as cypripedin, scutellarin, cactin or adonidin; either to be given in small and frequent doses till relief follows. If the debility is marked we may even resort to sparteine. When patients are susceptible to hemorrhages they should take time to ascend, limiting their upward trend to 1,000 feet per week, and remaining at each elevation till fully acclimated. Disregard of this warning has cost several of the writer's patients their lives. In all cases the exercise should be limited until the patient has learned to estimate his adaptability to the elevation. Many persons are so stimulated by the fresh, light air that they indulge in excessive physical work, until they suffer—and then they blame the climate.

The term mountain fever was formerly applied to a malady now recognized as true typhoid.

## TYPHUS FEVER

Typhus is the ship, jail, camp, spotted and hospital fever of Europe, occupying there something like the place typhoid does in America, as the common form of continued fever. But under the influence of modern hygiene it has become rare, so that now it is almost obsolete. In America typhus has never gained a foothold, though repeatedly brought here from Europe. Sporadic cases appear sometimes which can not be traced to any source, so that Murchison believed it might be developed sporadically. But to say that we do not know whence came an infection is far from indicating that there is no infection. In 1892-3 the writer went to New

York to study the cases at the hospital on North Brothers Island, brought to the port on the steamer *Massilia*, an opportunity rarely enjoyed by American physicians.

Typhus is a highly contagious fever, physicians and nurses being particularly prone to attacks. Crowding increases the liability to the disease and the virulence of the attacks. The contagium clings long to the clothing and furniture. The vital cause has not yet been determined.

The anatomic changes are due to the intense fever, consisting of granular degeneration of the muscles, especially the heart; the blood is dark and fluid, the liver swollen and soft, the kidneys, spleen and lymph follicles enlarged. There is no ulceration as in typhoid. Bronchitis and hypostatic congestion are features of both. On the skin is the rash.

The incubation lasts twelve days or less. There may be no symptoms during this period, or the ordinary discomforts of all infections. The invasion is abrupt, with a chill or rigors, fever, headache, aching back and legs; debility quickly supervening, fever reaching the maximum in two days; pulse full and fast, tongue white, soon showing dryness; the face flushed and the eyes congested. The face is more stupid even than in typhoid. Vomiting is usual. Delirium may be quiet, stupid or maniacal. Cough is common.

The rash appears about the third to fifth day, on the abdomen and chest, the face and extremities next; all of it coming out within a few days, not as with typhoid in crops. The skin is mottled finely a dusky red, and rosy papules appear which become petechial; dark to black, not disappearing on pressure or after death. Sudamina are uncommon. Some attribute to this fever a peculiar odor, and it was once held that inhaling this odor marked the infection of the one who inhaled it. The skin is dry.

In the second week the symptoms much resemble those of the third week of severe typhoid. The patient lies in a stupor, fever high, prostration great, eyes half closed, delirium muttering, pupils contracted, and conjunctivæ injected. The pulse is weak and rapid, the cheeks flushed. Coma vigil, subsultus and carphologia are usual; the tongue dry, brown and covered with sordes; breathing fast and shallow, the heart feeble. Death may occur now from debility, or crisis at the end of this week, the patient waking from real sleep, free from fever and restored to consciousness. There may be a profuse discharge of urinary solids, the urine being turbid.

The fever goes about a degree higher than in typhoid, the stupor is more profound, the prostration greater than in average cases. The morning remissions are less decided in typhus. Prostration comes much



sooner in typhus. There is more delirium. Slight leucocytosis occurs. Albuminuria is usual, with an increase in the urea and uric acid, and a decrease in the chlorides. Nephritis is rare.

Epidemics vary greatly in their virulence, and there are all grades from mild to foudroyant. Complications are bronchitis, pneumonia, pulmonary gangrene, noma, gangrene of the toes, nose or fingers, meningitis, paralysis, septic suppurations and hematemeses. One of the writer's cases lost an eye from perforating ulcer.

The prognosis closely follows that of typhoid. The young bear the malady better than the aged. Death near the end of the second week occurs from toxemic debility; later, from pneumonia.

The diagnosis from typhoid is made by the epidemic prevalence, the decisive onset, the petechial rash, early prostration, absence of abdominal symptoms, and earlier stupor.

Cerebrospinal fever and malignant smallpox and measles sometimes resemble typhus at first, but the course soon clears up the doubts. In many cases the diagnosis is difficult or impossible for a time.

The treatment is that of typhoid in all respects. Keep the bowels empty and aseptic; sustain the heart; feed frequently, with small doses of easily digested but richly nutritious food; give plenty of water; and keep the mouth clean. Treat the symptoms as they arise.

The lesson of lessons as to the treatment of the typhus fevers was given in the celebrated epidemic at the New York quarantine: The officers of an infected ship were cared for in a house, and *one-half died*; The commoners were treated in a shed, with a roof and three sides, the other open. So flimsy was the shelter that a rain-storm saturated the fortunate patients. *All recovered.*

Burggraave thus epitomizes his treatment: Keep the digestive tract clear by the use of saline laxatives; sustain the strength with strychnine; combat the fever with aconitine; establish diuresis with digitalin; prevent a return with quinine arsenate or ferrocyanate; act on the digestive functions with quassin and soda arsenate; reconstitute the blood with iron and cinchona; and adopt a nourishing regimen.

C. D. Ussher, of Van, Turkey, says that in this fever calcium sulphide comes pretty near being a specific as to prophylaxis and cure.

## RELAPSING FEVER

Relapsing fever appears in company with typhus, so that each epidemic is composed of the two, in varying proportions. The hygienic conditions giving rise to the one apply usually to the other. It is less contagious

than typhus, is transported on clothing, and one attack does not confer immunity. The specific cause was discovered by Obermeier, in a spirochæte from three to six times the length of a red corpuscle, a spiral filament to be seen moving among the red cells during a paroxysm. In the intervals these are replaced by small shining bodies thought to be spores. Inoculation with blood taken during the paroxysm has produced the disease in men and in monkeys, and blood from a bedbug has also produced it in a monkey.

There are no characteristic anatomic changes. In fatal cases the spleen is large and soft, the liver, kidneys and heart show cloudy swelling. Infarctions may be present. The marrow has been found hyperplastic. Ecchymoses are common.

The incubation may last a week; how much less is uncertain. There is an abrupt invasion, with chill, fever and intense back- and leg-ache. Convulsions, nausea and vomiting are more usual in the young. Fever rises even to 104° F. the first evening. The pulse goes to 120 or more. Delirium comes early. Sweating is common. The spleen enlarges soon. In some epidemics the force of the attack is exerted on the stomach, with jaundice. The bowels are rarely affected. Cough, herpes, petechiæ and miliary vesicles sometimes appear. Leucocytosis is usual. Crisis comes within a week with profuse sweating, diarrhea or urinary turbidity, great fall of fever, and in the aged or feeble with collapse. After a week of convalescence the relapse occurs, lasts a week, and again there is crisis. Even a fifth relapse has been reported, each shorter than the preceding. Convalescence is then tedious as the debility is profound.

The prognosis is much better than in typhus, the mortality being about 4 per cent. It is more dangerous to the aged and debilitated. Pneumonia is the most frequent complication; nephritis, hematuria, rupture of the spleen, hematemesis, pareses, ophthalmia and in pregnant women abortion, are rarer. The case can only be distinguished at the onset from mild typhus by examination of the blood. Later, the relapses make the diagnosis clear.

The treatment is that already recommended for typhoid and typhus. The probability of collapse in the aged at crisis must not be forgotten. No reports have yet appeared on the effects of alkalometric treatment in this malady.

## MALARIA

Malaria has been greatly restricted in recent years by the drainage of low lands and cultivation of river bottoms. But the cause still may exist in the soil and display its activity when circumstances favor it: Some

years ago a deep excavation was made in Port Richmond, Philadelphia, for a sewer, and as each square was opened up the writer had several cases of malaria shortly after the deeper layers of the soil were laid bare. There had been no malaria there within the memory of old residents.

Throughout the southern coast states and along the Mississippi Valley malaria still prevails extensively; but in southern Illinois and Indiana, notorious as its chosen habitat, it is but a shadow of its former prevalence. The resident of "Egypt" no longer takes his daily quinine as a matter of routine. In Chicago the writer recognized cases of malaria during a wet fall, in the low-lying sections on the south side, in 1894, but has seen none since. The opening of work on the Panama canal will render us more familiar with the graver forms of malarial intoxication, the valley of the Chagres river having been long notorious for them.

***Plasmodium Malariae*:**—This organism is the principal cause of disease and death in the tropical and subtropical countries of the globe. There is no reasonable doubt that it is the cause of malaria. Manson thus sums the evidence:

The plasmodium is always associated in the blood with the clinical phenomena of the disease.

Malarial fever at some time in its course is invariably associated with the plasmodia in the blood.

The phases of malarial fever bear a definite relation to the phases of the life-cycle of the parasite.

The absolutely characteristic features of malarial disease—melanemia and pigmentation—are fully accounted for by the melanin-forming property of the plasmodium.

Intravenous injection of blood containing the plasmodia is followed after incubation by malarial fever, the plasmodia appearing in the blood of the person so injected.

Quinine causes the cessation of the malarial disease and at the same time causes most phases of the plasmodium to disappear from the blood.

In mosquitoes that have imbibed malarial blood the evolution of the parasite may be traced till the germs are found in the salivary glands and secretion.

If after due incubation such a mosquito bites an uninfected person he will in due time exhibit the symptoms of malaria and the plasmodia may be found in his blood.

The malarial plasmodium belongs to the Sporozoa and is closely allied to the Coccidia. For a portion of its life it is an intracellular parasite, inhabiting the human red blood cell. Other vertebrates are infected by similar but distinct parasites.

Malarial blood an hour before the paroxysm shows the parasite as a pale disc in some of the red cells, dotted with pigment granules. These collect into groups or radiating lines, then into two central masses, around which is the pale protoplasm in segments, gradually forming round spores. The corpuscle breaks down and liberates these spores with the pigment, which float off in the blood-stream. Many spores and the pigment are taken in by the phagocytes, but some escape and penetrate other red cells. Here the parasites exhibit active amœboid movements, and grow at the expense of the hemoglobin, which they assimilate with their pale protoplasm and melanin granules. The amœboid movements cease as the parasite fills the cell, just before sporulation.

Staining with methylene blue, the spore shows a minute deeply tinted nucleolus, an unstained vesicular nucleus; and a lightly tinted protoplasmic covering. After entering the red cell the nucleus and protoplasm are larger, the nucleolus, sometimes double, lies eccentrically in the nucleus, the appearance having been compared to a small blue signet ring sticking to the blood cell. As it grows to maturity the nucleolus disappears and the nucleus becomes indistinct, its elements forming numerous nucleoli about which the protoplasm is arranged to form the new spores.

The plasmodia may disappear from the blood as the symptoms subside, spontaneously or after quinine, and become latent. Where the parasites take refuge or what they do there, is unknown. But all elements that induce depressed vitality favor the reactivity of the parasites, as all that favor vitality, besides quinine, favor latency. Plehm suggests that the specks often seen in the red blood cells of Europeans residing on the west coast of Africa, who have not had malarial attacks as yet, are the lost spores which await a necessary loss of vigor before they can attain full development and produce malarial fever. He believes these "primitive bodies" multiply in the blood and destroy red cells indefinitely until this full development occurs.

Fresh malarial blood frequently contains flagellated bodies, with long, actively moving arms, one to six or more, composed of pale protoplasm and melanin, but not in the red cells. Their length is three or more times the diameter of a red cell. The body is half the diameter of a red cell. Their delicacy and rapid, vigorous movements makes it difficult to detect them. Sometimes one becomes detached and swims free in the blood serum, with three motions—undulating for locomotion, vibratile when coming in contact with other bodies, and coiling just before all its motions cease. These bodies develop from two forms of intracellular parasites, the crescents and certain plasmodia just previous to the concentration of



the pigment and sporulation. They are never seen in freshly drawn blood but only after the slide has been mounted ten to thirty minutes or more.

The crescent bodies have a defined shape, blunt-pointed crescents, probably a delicate limiting membrane, needles of melanin near the center and a peculiar line beginning near one end on the concavity and passing like a bowstring to the corresponding point near the other end; supposed to be the remains of the red cell in which the parasite develops. Two sometimes develop in one corpuscle. The pigment may be scattered, or concentrated, or there may be vacuoles; corresponding to the age of the crescent as young, mature or decaying. The pigment in the first alone exhibits some motion. In the first the stain takes uniformly, in the second bipolarly. Two nucleoli may be found at the center. Mannaberg looks on the crescent as a syzygium, from union of two amœbæ in one cell. Bastianelli finds in it a sexual conjunction, and says the male protoplasm stains more deeply than the female. The young form may be recognized in the spleen and marrow the fourth day of the disease, as minute, highly refringent amœbæ; rarely in blood from the surface of the body, where the second form is found a week after the first attack.

The flagellated body may be swallowed by a phagocyte; if not, the flagellæ continue in active movement for an hour, then curl up and fade away. If the flagellæ get loose the remains of the body assume a passive spherical form.

In another form of the malady certain intracorpuseular parasites, only differing from the rest by the greater activity of the pigment, emerge from the cell without sporulating, violent motion within the parasite follows, and flagellæ are suddenly projected. The formation of flagellæ is favored by the access of air or water.

Since the flagellated body only develops outside of the human body, and the plasmodia are in the body always enclosed in a blood-cell and do not leave the body by any excretory door, Manson deduced the theory that they must be removed from the human body by some blood-sucking animal; and the mosquito of some particular species, inhabiting the malarial regions, operating at night, etc., best answered the requirements. Ross first showed that when blood containing malarial crescents was taken up by the mosquito the formation and detachment of flagellæ was very active. Next he found malarial parasites imbedded in the stomach walls of such mosquitos. In the next place he found that if a particular species of mosquito is fed on blood from birds infected with proteosoma (a closely allied species of parasite), the parasite entering the insect's stomach wall and there developing spores, these enter the venosalivary gland and the insect is then capable

of infecting other birds by its bite. By observations on *Halteridium*, another of this parasitic group, MacCallum found that the function of the flagellæ is to impregnate certain granular crescent-derived spheres, which then become "beaked and traveling vermicules." Grassi showed that several species of *Anopheles*, especially *Claviger*, is the special host of the human malaria parasite. He traced the crescent-forming and certain benign parasites through the mosquito, and induced malaria in man by the bites of infected mosquitos. Every step of these observations has been abundantly confirmed by many others. There is no room for doubt that the *Anopheles* conveys malarial disease to man when herself infected by the parasite.

In the *Anopheles* the crescents form hyaline and granular spheres; the former emit flagellæ, which separate and seek energetically by boring and butting to force their way into the granular spheres. One enters at a papilla that seems to rise to meet the flagellæ, causing much disturbance in the sphere, and then disappears. No other flagellæ can force an entrance. The sphere then gradually alters in shape to a wormlike form, the pigment gathering at the blunter end, and then begins to move about, the sharp end first. This traveling vermicule penetrates the wall of the insect's stomach, lodging among the muscular fibers. Here it grows rapidly and protrudes from the stomach wall. Meanwhile the contents have divided into many little bodies covered with spines like a porcupine, which are left free by the disappearance of the spheres. These sporozoites are in about a week discharged into the stomach of the mosquito. They thence pass into the veneno-salivary glands, from which a duct carries them to the bases of the mosquito's proboscis. If this mosquito bites a human being the sporozoites are injected into the blood, where they multiply, and in about ten days their descendants appear as the malarial parasites of the type originally seen.

The complete cycle of the parasite therefore begins with its entrance into the blood as amœbulæ; maturing into sporocytes or gametocytes; sporocytes dividing into spores which enter fresh blood cells as amœbulæ, completing the endogenous cycle and providing for multiplication within the animal body; gametocytes belong to the exogenous cycle passed in the mosquito, and are male hyaline or female granular spheres; the male emits microgametes or flagellæ, one of which detaching enters the single macrogamete which constitutes the granular sphere, the union producing a mobile zygote which passes to the mosquito's stomach, where it develops and divides into zygotomeres and residual bodies. The zygotomeres are converted into blastophores with zygotoblasts (sporozoites), which are discharged into the saliva and being carried into the blood of a man develop into amœbulæ and a new cycle begins.

MALARIAL

There are certain facts that seem to indicate that there is yet an undiscovered phase of the life of the parasite. In some districts in Africa the malaria has rendered the life of a man there impossible, yet malaria remains.

Men who open up the soil for various excavations are specially liable to become malarious, yet the mosquito does not seem to have anything to do with such workers rather than with others. The parasite may be capable of infecting some other animal than man; or it may pass directly from one mosquito to another. Or, there may be some form in which the parasite may lay latent in the soil or the water of infected localities until it is taken into the bodies of its hosts. But this is simply a conjecture. Grassi claims that malaria is only contracted by man from the bite of the mosquito; and that the mosquito only becomes infected by biting a malarial man. Which began the row is as difficult to settle as the origin of the first egg—or chicken. We can only say that up to date no other method of infecting man with malaria than by the mosquito has been proved.

The common mosquito that infects our houses is the *Culex*, which has not been shown to carry disease as yet; that which bears the malarial infection being some species of *Anopheles*. Of this genus four species have been found to be infected, the principal one in Europe and America being *A. claviger* or *maculipennes*. The ova are laid in natural pools or sluggish streams, in masses of three or four, adhering to weeds; the active larvæ feed on algæ, come to the surface to breathe with body parallel to the surface and when disturbed glide away tail first with skating movement. The mature insect has maxillary palpi nearly as long as the proboscis, each with five segments, the wings are usually spotted, and when at rest the body of the insect is at a wide angle with the surface. Only the female sucks blood—the male is harmless and inoffensive. His feathery antennæ give him the popular name of “wooly-head.”

The limits of this work will not permit of detailed description of the methods employed to detect the malarial parasites in human blood. The reader will find this excellently described in Manson's work on Tropical Diseases.

Whether there are several species of malarial parasites or one taking different forms, is not yet settled; but the correlation of biologic studies and clinical phenomena has shown five distinct types of the disease, corresponding to five variations in the parasite. Two are termed benign, one with a cycle of 72 hours, the other with one of 48 hours, causing the milder quartan and tertian fevers.

Of the malignant forms there are three, one pigmented with a 48-hour cycle, another pigmented with a 24-hour cycle, and an unpigmented form with a 24-hour cycle. The benign do not form crescents; the malignant do.

The old distinction between intermittent and remittent forms being based on non-essential characteristics may as well be dropped. If all the parasites mature at once the attack is intermittent; if some mature at one time and others at different times the case will be remittent. Two or three broods of the same or different forms may produce the complicated affections described by the older writers.

An attack of intermittent fever is made up of paroxysms recurring in 24, 48 or 72 hours. During the incubation there may be a sense of weakness, stretching and yawning, aching bones, headache, anorexia, and curious sensations of cold in the back. Slight fever may be present. The patient feels "bilious." When the chill occurs the sense of cold spreads over the whole body, the patient is cold, pallid, shrunken, "goose-flesh," shivers, teeth chattering, cyanotic, and often vomits freely. The skin is cold but the internal temperature rises several degrees. In children a convulsion may replace the chill. This stage lasts from ten to sixty minutes. In infants under a year there is no shivering but the child becomes cold and cyanotic, and lies quiet, so that the parents fear it is dying; and this may last several hours, gradually subsiding during the afternoon. The pulse is tense and wiry; the fingers shriveled and icy cold.

The cold shoots in the back begin to be mingled with needles of heat, which gradually replace the cold; the cutaneous spasm relaxes, the pulse becomes full and bounding, the skin reddens and now seems swollen, the head throbs painfully, the covers before clutched tightly are now thrown off, breathing is rapid and the temperature rises higher, to 105°F or more. The thirst is great and the stomach may be still disturbed. Delirium sometimes occurs. This stage may end in half an hour or last four hours.

Sweating begins on the face and quickly extends over the entire surface, from which perspiration streams. The fever falls fast, the headache and gastric distress subside, and the patient is immensely relieved, often falling asleep, though quite weak. The temperature falls below normal as a rule. The duration of the whole paroxysm varies, but is usually between six and ten hours.

The cold stage is one of intense cutaneous vasomotor spasm, and the urine secreted is abundant and pale, with low specific gravity. During the hot stage this spasm is relaxed and the excretion is febrile, scanty, red and concentrated, sometimes albuminous. Urea is increased during the chill, as are chlorides; phosphates decreased but excreted freely during sweating when the urine may appear muddy. Urea excretion begins to rise before the chill, subsiding when the hot stage begins but remaining high throughout all the stages. Carbonic excretion corresponds with urea.



This increased urea excretion recurs even when the paroxysm is prevented or jugulated by quinine (Ringer.) Bile is often present in the urine, or Gubler's brown pigment; sugar occasionally.

The spleen enlarges during the chill, and its edge may be felt below the margin of the ribs. This subsides after the paroxysm, but less completely after each, so that its permanent enlargement is a feature of chronic malaria. Each paroxysm destroys some red blood cells, and a corresponding degree of anemic cachexia is induced—a little more after each chill.

Two-thirds of the attacks begin between midnight and noon. About 10 a. m. is the time chills are usually expected. Quite often the attack is atypical, being represented by chilliness, headache, nausea, depression, or febricula. In a dangerous form there is fever up to 104, but little else to warn the patient of danger until pernicious symptoms supervene suddenly. Or there may be vomiting and weakness, or neuralgia, with no chilliness. In fact, in malarious districts the physician learns to detect malaria in all manifestations recurring periodically.

During the intermission there may be no symptoms beyond weakness, and the patient may even attend to his usual work on his "well days". Herpes about the mouth is frequent, also cough and bronchial irritation.

If the attack occurs every day at the same hour it is known as a quotidian; if on alternate days it is a tertian, the recurrence completing a cycle of three days; while a recurrence on each third day constitutes a quartan ague. Sometimes the chill occurs a little earlier each time, and at others a little later. If they are prolonged until the succeeding paroxysm overtakes the incomplete one preceding, it is called subintra, and if the temperature does not entirely fall to normal it is remittent. There may even be no remission but the fever continues. Mixed infections and the hatching of different broods may give rise to double tertians or quotidians, or combinations of any of the primary types.

The stages of the disease are believed to correspond with the phases of the parasite's life. As the rigor approaches, pigment concentrates in its body and just before and during the chill sporulating bodies are breaking up and possibly liberating toxins; during the hot and sweating stages young parasites are free in the blood, or have penetrated red cells, and leucocytes are disposing of free pigment, while toxins are being eliminated; during the intermission many parasites are shut off from the circulation and maturing within their hosts, the red cells. But the presence of parasites in the red cells cannot be the cause of fever, since they may be found in abundance free in the blood during the intermission. The hypothesis that fever is due to a toxin diffused when the plasmodia escape from the red cells accounts

for the remittent and continuous forms, during which sporulating plasmodia are found in the blood at all times.

The parasite of quartan fever has a cycle of 72 hours. It first appears as a small round speck on the hemoglobin of the red cells. Its amoeboid movements are feeble, and cease when it has become pigmented. The arrangement of its large coarse particles of pigment has won it the name of "Daisy;" eight or ten particles being arranged around a large central mass. Very active movement of pigment characterizes the cells that are to become flagellated. This parasite does not enlarge the red cell in which it develops, but completely fills it, leaving a narrow rim of hemoglobin. It is more easily detected in peripheral blood than the other parasites. The disease arising from this form is common in temperate regions, becoming rarer as the equator is neared. The paroxysm is well marked, cachexia and anemia develop but slowly, it is amenable to quinine. Osler thinks the attack apt to cease spontaneously though liable to recur; but Manson considers it more persistent than tertians.

The parasite of benign tertian differs from that of quartan in greater amoeboid motility, decreasing till it ceases, when pigment concentration is complete; the pigment particles are finer, in incessant motion, mostly in the peripheral zone; the red cells containing parasites are much enlarged and pale; when segmentation is complete it resembles a bunch of grapes with black pigment masses included; the spores are smaller, rounder and smoother than the quartan, seldom showing nucleoli unless stained, and number from 15 to 26. This parasite is found in temperate and tropical lands alike, often occurs doubled, and is probably the most frequent cause of quotidian and tertian agues. Its fevers resemble those of the quartan except in the shorter cycle.

The three malignant parasites may be found alone, together, or with the two benign forms. The former are much the smaller. Until pigmented they are not easily detected. At first the amoeboid movements are very active, and as they grow quiet they assume the ring form. More than one often attack a red cell, owing to the vast number of parasites. The affected cells seem to be retained by the vessels of internal organs and marrow, so that they are scarce in blood from the surface. The invaded cells often become crenated, folded and quite dark, called by the Italians "brassy bodies." The crescents appear about a week after the intracorpuseular plasmodia, and multiply for some days, persisting for some weeks after the latter have disappeared. Quinine may prevent their development but has no influence over them when once formed. They do not cause fever but cachexia. The fever these parasites cause is irregular in type, the rigor short, the fever prolonged, with more weakness, gastrointestinal disturbance, aching,

headache, etc. Relapses are frequent, in 8 to 14 days. Many red cells are destroyed and cachexia is rapid. Pernicious symptoms may develop at any time. The two quotidian parasites, pigmented and unpigmented, usually occur together, are very active, annular, and previous to sporulation occupy less than half the red cell. They form six to eight minute spores. Segmenting forms are found in splenic blood.

Intermittent malarias occur in cool climates and seasons, and as first infections; relapses are apt to be due to malignant parasites and to be dangerous. But if a malignant infection is contracted in hot weather or a low latitude, relapse may occur in cooler circumstances. Benign first attacks are usually intermittent, sometimes remittent; malignant attacks are just the contrary. First attacks of newcomers in highly malarial hot localities are remittent and severe. Under favorable circumstances some remittents run their course to recovery in about two weeks, the plasmodia and fever then disappearing together. Possibly when the invasion is not too numerous the phagocytes can take care of the sporules as they emerge from the corpuscles, and no febrile attacks result.

Bilious remittent has been recognized as a distinct variety from the bilious vomiting, diarrhea, etc., attendant. Hematogenous jaundice attends. The anemia is marked, and chronic malarial toxemia is a frequent result.

Typhoid remittent is a much graver affection, with symptoms of the typhoid state, low muttering delirium, dry brown tongue, great prostration, subsultus, swelling of spleen and liver, and melanemia. Many die.

In Kelsch's adynamic form are seen stupidity, restlessness, nervous, cardiac and muscular depression, great and rapid destruction of red cells, jaundice, melanemia, leucocytosis, syncope, hemorrhages, local gangrene, sometimes hemoglobinuria. These forms are more apt to occur in consumptives, syphilitics, alcoholics and nephritics.

The term 'pernicious' is applied to a group of symptoms appearing often in the course of remittents and sometimes following attacks that seem to be at first ordinary intermittents. There are two types, the cerebral and the algid. Patients residing in highly malarial districts may suffer from a mild attack, when suddenly hyperpyrexia and coma set in, the patients dying of what is believed to be apoplexy or sunstroke. The fever jumps to any point up to  $112^{\circ}$ , with wild or low delirium, stupor supervening and within one or two hours the patient dies comatose. In other cases coma comes without fever, or even with abnormal temperature, to break in a critical sweat or the patient dies in collapse. Sudden delirium, convulsions, apoplexy, paralysis, tetanus and aphasia, may be simulated by these cerebral attacks, and when not fatal permanent mental disorder may result. They are now attributed to embolism of various cerebral capillary tracts.

Amblyopia, temporary or permanent, results from obstruction of the ocular vessels.

The algid forms are characterized by extreme coldness of the skin and extremities, from vasomotor spasm, with a tendency to fatal syncope. The internal temperature is high. Acute gastritis may be present, with incessant vomiting, great gastric distress and tender retracted abdomen. Or the attack vents its fury on the bowels, with choleraic symptoms, the stools containing bile, sometimes blood and mucus. Muscle cramps, aphonia, pinched face, shrunken fingers and scantiness of the urine may be present and end in fatal collapse. The resemblance to cholera may be close, but there is high internal fever, a history of malaria, subsidence of symptoms as the hot stage occurs, and bilious stools. In doubt the blood examination tells the tale.

A third algid form takes the semblance of dysentery; and in truth the dependence of disease upon malaria is to be kept in mind. The blood again furnishes the diagnosis.

While the preceding attacks occur with the chill, in the syncopal form collapse supervenes in the sweating stage, which is excessive. Death may follow an attempt at rising, especially in the feeble and cachectic.

These abdominal forms are probably caused by an accumulation of plasmodia in the mucous capillaries. The sweating may be ascribed to the destruction of red-blood cells, or to reaction from the malarial toxin. The practitioner in dangerously malarial districts learns to be on the alert as to these maladies, and to be solicitous over irregularities in the course of mild attacks, mental disturbance, alteration of knee jerks, restlessness, peculiarities of behavior, and other indications of something abnormal or unusual. Wetting and chilling, errors of diet, and all causes of vital depression, are to be avoided for months after leaving the scene of a malignant malarial attack.

**Hemoglobinuric Fever:**—This is popularly known as blackwater fever. The paroxysm begins with chill, bilious vomiting, jaundice and black urine in small quantities. It occurs in the Gulf belt and the West Indies. Manson believes that the form he sees, the African, at least, is a distinct disease due to a distinct parasite. Even if the patient recovers he is left with intense anemia and damaged kidneys, and a strong disposition to recurrence of similar attacks, any of which may be fatal. The attacks are more frequent in those who have become saturated with malaria during the residence of over a year.

After ordinary malarial attacks, controlled by quinine, the victim has one apparently similar, irregular and bilious, with aching in the kidneys, liver and bladder; he feels an urgent demand to urinate and finds the urine



dark, brown or black. Fever continues, with gastric distress, bilious vomiting and possibly diarrhea, or constipation. With profuse sweating the fever falls, the urine is excreted more freely and gradually pales. The skin has been saffron-colored and this deepens for several days. Subsidence of the attack leaves behind it profound weakness. Fever may recur in any of the classic types or irregularly. Hemoglobinuria may recur or not. The urine may be copious or become scantier and gummy until suppressed. The worse the attack, the greater will be the gastric distress and vomiting, and pain in the back and liver. The worst cases die, from adynamia, cerebral or algid symptoms. Sometimes the symptoms resemble those due to sudden hemorrhages—jactitation, cold sweat, sighing and syncope. Total suppression of urine for some days may cause coma, convulsions and syncope, or nephritis with uremia may cause death some weeks after the attack has passed off.

The urine on standing separates into an upper layer, clear, very dark port-wine tint, and a lower brownish-gray sediment, containing many hyaline and hemoglobic casts and granular matter. The serum globulin escapes with the hemoglobin as the urine turns nearly solid on heating. There are few or no red cells. The albumin gradually diminishes after the color has become normal. If death occurs early the kidneys are congested, the tubules gorged with hemoglobin, the cells with yellow pigment, the capillaries with black. After death later from uremia the large white kidney is found. The liver is large, soft, dark yellow, with cloudy swelling of the cells, which contain yellow pigment.

This is Manson's account of the African hemoglobinuric fever. How far does it agree with the appearance presented by the disease in our southern states?

The malarial parasites present disappear during the course of hemoglobinuria, and it may finally terminate a chronic malaria—a spontaneous cure.

**Anatomy:**—The loss of red blood corpuscles and consequent anemia are out of all proportion to the number attacked by the parasites, for while 5 per cent of corpuscles affected would be a very high and unusual percentage each ordinary chill occasions a loss of 5 to 10 per cent of the corpuscles. A pernicious paroxysm may lessen the red cells a million per c. mm., and from 5 million the count may fall below one million. There is also usually a fall in the hemoglobin of remaining corpuscles that may reach 50 per cent. Still further, there is a loss of volume of the blood; so that with less blood, poorer in cells and these poor in iron, there is reason for the extreme pallor. By reduction of the volume of blood it happens that congestion of the spleen and liver is less than would be expected, the portal system being empty.

The loss and its repair are greater in first attacks than in relapses. The greater losses from severe attacks are not absolute.

After death in an acute attack the spleen is found to be enlarged, dark and soft, even pultaceous; the liver ditto, the encephalic vessels engorged, the gray matter leaden, the marrow dark and congested, and this dark congestion may affect the lungs, kidneys and bowels.

Pigmentation is pathognomonic of malaria, and malarial blood always shows it; also it is found in the endothelial cells, often in leucocytes, forming thrombi that occlude vessels, and in the spleen and marrow alone pigment is found in the cells of the parenchyma. Intravascular black pigment is found only in malaria.

This pigment is insoluble in strong acids, is altered by potash, and quickly soluble in ammonium sulphide. That in the leucocytes is obtained from the parasites. In the spleen a phagocyte may contain at the same time pigment, parasites, broken hemoglobin and even a number of entire cells, mostly containing parasites. One phagocyte may even contain a second, and that a third. The pigment is most abundant in the splenic vein; in leucocytes and in large white cells. Some of these are also found in the liver, but rarely beyond it. More parasites are also found in the spleen than elsewhere. After malaria has existed a time pigment can also be found in the vessel walls and perivascular lymph-spaces, whence it goes to the lymphatic glands for final disposal. Those in the hilum of the liver are markedly pigmented in chronic cases.

These facts show that the destruction of red cells in the blood is but small as compared with what is going on in the spleen, marrow, liver and elsewhere. The contest in the blood is only skirmishing.

The black pigment is pathognomonic, but of little importance pathologically. Kelsch and Kiener describe a pigment ochre also, in the protoplasm of parenchymatous cells generally. It is also found in other diseases with great and rapid destruction of red cells. It is insoluble in acids, in alkalies and in alcohol. It gives the reaction for iron only when long deposited in the tissues. To a certain point the liver can convert hemoglobin into bile pigment, the bile being increased thereby; hence the bilious symptoms so common in remittents. The yellow skin is probably tinted with free hemoglobin and not with bile. When the liver has reached the limit of its function of pigment conversion the surplus is stored in the parenchymatous cells. This is the pigment ochre. If the liberation of hemoglobin be too great for such disposal we have hemoglobinuria.

This enormous supply of free hemoglobin may be partly derived from the red cells, which as we have seen lose a part of their stock. Manson suggests that at the chill there is a sudden liberation with the parasites

emerging from the red cells of a hemoglobin-solvent agent, which may have served the purpose of a digestant to the parasite during its intracellular life.

The red cells are larger than usual, and some megalocytes are present, also small dark embryonic forms, and some of irregular outline and indisposed to form rouleaux. In one case not a sound corpuscle could be found.

In mild attacks the leucocytes are decreased in number until the end of the paroxysm; then rise a little till two hours after the chill. The large mononuclear cells are greatly increased. In malignant forms the conditions are not clear, but in some cases of pernicious attacks there is an increase in surface blood, which may even be enormous (Billings). The hemato-blasts decline during the paroxysm and rise above normal during the intervals (Hayem).

What causes the fever and its periodic recurrences? The cycles of the parasites, quotidian, tertian and quartan, correspond with phases of the febrile paroxysms. The attack of fever coincides with the escape of parasites from the red cells. Some toxin then escapes into the blood to which the phenomena are to be attributed. The periodic liberation of this toxin accounts for the periodicity of febrile attacks and its elimination puts a stop to them.

But why should the entire swarm of parasites develop and escape from their cells at about the same moment? Manson attributes this to the quotidian periodicity in the rhythm of the physiologic processes of the human body. All animals but man are immune against malaria; some men are immune; others acquire some immunity by residence in malarial districts; the first attack of a newcomer is apt to be remittent or continuous, but as the resistant forces of the body increase, they are able to protect the man during all the day except the time when the attack occurs. Parasites maturing earlier or later than this unprotected period perish, while those maturing at this time survive.

This hypothesis does not commend itself to the writer. Judging from the effects of heat in developing all forms of malaria, and the coincidence of malignant forms with torrid climes and seasons, it does not seem far-fetched to attribute the occurrence of chills at about 11 a. m. to development of the parasite at that hour by the heat then supplied by the sun. It is a tradition of malarial places that sitting in the sun will develop ague.

Spontaneous recovery proves the existence of a protective power in the human body. Such cases are not usual.

**Malarial Cachexia:**—This may follow severe or long-continued acute attacks, or be developed by long exposure to its cause. The symptoms are anemia, an earthy hue of the skin, yellowish eyes, enlarged spleen, and in the early stages enlarged liver. Irregular febrile attacks are frequent

after fatigue, exposure or other causes of lowered vitality. Fever is not essential; in fact, one case coming under the writer's notice was recognized as malarial by its persistent subnormal temperature with periodic crises. Many residents of malarial regions have enlarged spleens—big bellies and thin shanks, dull and depressed aspect, earthy complexion, rough unhealthy skin, dark and with patches of pigmentation on tongue or palate. The parasites have been found in the blood of a four-months-old babe, and it is asserted that infants are born malarious. But Bignani failed to detect parasites or pigment in the fetus of a woman who died of a pernicious attack. Children early affected are apt to be poorly developed, stunted, and as abortion and sterility are usual results the population is repressed.

Many functional ailments appear in these cachectics, which tend to periodic recurrence; such as neuralgias, gastralgias, gastric, intestinal and other crises, headaches, palpitation, hiccough, sneezing and various eruptions. Besides their periodicity these affections are controllable by quinine, although such maladies are not usually amenable to this remedy. Hemorrhages of all varieties are common in some cases and trifling operations may then prove fatal. Gastric and intestinal ails are the rule; dyspepsia, morning diarrhea; low forms of pneumonia carry them off.

If there is only anemia with portal congestion the patient may recover promptly; if there is organic abdominal disease the final ending is death.

The pathology is that of acute forms. Splenic growth may be enormous, the connective hyperplastic, the pulp soft and stained with black pigment. This "ague-cake" is diagnostic of malaria, and its frequency tells of the insalubrity of the district. The tumor is easily ruptured by a blow. The liver may be permanently enlarged by febrile attacks, not by afebrile conditions. Cirrhosis results in time. When the yellow pigment responds to tests for iron it is known as siderosis. There is no tendency to suppuration.

Similar changes take place in the kidneys; the cardiac muscle degenerates and its walls dilate; dysentery, diarrhea, low pneumonia tending to abscess, empyema, phagedena, noma, pernicious fever, may occur; splenic leukemia is a sometimes remote effect.

**Etiology:**—The invasion of the parasites is now established to be through the mosquito. All agencies tending to favor the breeding, infection and access of these increases the liability to malarial fevers. Manson claims that the evidence of an invasion may not appear for months or years after the bite. In colder latitudes the connection of malaria with swamps is much closer than in the tropics; infection is milder, and active only in late summer and early fall. Flats at the base of mountains, waterlogged; deltas of large rivers; the pools along dried-up river beds; uncultivated fields and tracts just deforested, are often malarial. But elevated, arid, sandy plains are



sometimes intensely malarial. It is a disease of the country rather than the city. Occurring on ships at sea, the mosquito may have been an unauthorized passenger. Many peculiarities hitherto inexplicable are resolved by the mosquito theory.

A sustained average temperature above 60°F is necessary. Altitude has no direct effect. Water is essential—best in small pools with no fish, as they eat the larvæ. Decomposing organic matter is not essential. A high level of the subsoil water favors mosquitoes and malaria. Hence comes the danger from subsiding floods, or raising the water level by engineering works. The overflow of swamps stops the fever—washes out the mosquito broods. The mosquito seeks shelter from even slight winds, and does not rise more than a few feet from the ground; hence transport by winds is not notable.

A mile between a vessel and land secures the crew. Italian peasants secure immunity by passing the night on platforms raised on poles a few yards. Trees protect dwellings from swamps behind the trees, by stopping the mosquitoes. The infection is most active at night, and the mosquito works between sunset and sunrise. The unquestionable facility with which malarial infection follows disturbing the soil by digging up streets, etc., cannot be explained on the mosquito theory, and suggests that there are other methods of infection as yet untraced. But the introduction of malaria by infection of the mosquitoes from an infected visitor explains many hitherto mysterious outbreaks. Further studies of the various species of mosquito are needed.

**Acclimatization**—Manson attributes much of the alleged acclimatization of residents in malarial districts to the minute care they have learned to take of themselves. Some persons are absolutely immune. The negro is less liable than the Caucasian, while the Chinese and other dark races are less affected than the whites, but more than the negro. The whites of southern Europe have not inherited immunity so much as they have learned how to live.

**Diagnosis**:—The practitioner in malarial districts gets to see the malady in everything. Periodicity and a curative effect from quinine suffice, though these are uncertain. In doubtful cases the microscopic examination of the blood is infallible. The detection of the plasmodia or of melanin suffices.

Quinine is useful in intermittents and larval forms but less so in severe remittents. It requires time also. Tertian and quartan periodicity occur only in malaria; quotidian is less conclusive. It occurs in abscesses of the liver; but here the spleen is not enlarged, fever rises highest in the afternoon, perspiration is not specially post-febrile, but occurs in sleep; and dysentery

almost always has preceded the abscess, in which the periodicity is quotidian never tertian or quartan.

Yellow fever and hemoglobinuria are constantly mistaken.

**Yellow Fever:**

**Malaria:**

Sthenic	Asthenic
Violent headache	Not so prominent
Injected eyes	Eyes yellow
Mahogany face	Livid, cyanotic or yellow
Albuminuria marked and increasing	Slight if any
Hematuria rarely	True hemoglobinuria
Spleen and liver little enlarged	Enlarged early and greatly
Epigastric tenderness and burning	Not marked
Vomit white, later black	Vomit bilious, rarely blood
Jaundice late if at all	Jaundice early
Endemic in limited areas	Wide and known range
Pulse slow as to fever	Pulse weak or wiry, rapid
Attacks newcomers	Attacks old residents

The onset of yellow fever is totally unlike any but very rare cases of malaria, the urine is scanty to total suppression, and there is an irritability of the stomach far exceeding anything seen in malaria. But in some cases it seems impossible to make the diagnosis except by the microscopic examination of the blood. Does this exclude yellow fever? Suppose that during an epidemic of the latter, persons who are malarious are seized with yellow fever?

In cerebrospinal meningitis we have stiffness of the neck, and the eruptions. Urethral fever, gall-stones in the very young, renal suppuration, lymphangitis, tuberculosis hectic, ulcerative endocarditis, Mediterranean fever, pernicious anemia with splenic leukemia, visceral syphilis, rapidly growing sarcoma, hysteria, and other affections may present quotidian paroxysms resembling ague. But the spleen is not always enlarged in these, the crises are always quotidian, never tertian or quartan, quinine has no decided beneficial effect, and each has its own special symptoms; so that even without resort to blood examination it can usually be diagnosed.

In doubtful cases the microscope and Widal's test are necessary to separate malaria from typhoid fever. When typhoid attacks a malarial subject there may be several well-marked chills at the beginning, the typhoid symptoms gradually becoming manifest. Pernicious malaria may so closely resemble sunstroke, apoplexy, dysentery, cholera, puerperal fever, pneumonia, aphasia, etc., that the microscope alone will distinguish the real malady.

Five minutes suffice to secure a certain diagnosis; and with this to direct a certain therapeutics, promptness, strength and boldness in treatment will

give results that will seem miraculous to the feeble therapist who timorously experiments with uncertain weapons after a tentative diagnosis.

**Treatment:**—One of the greatest advances ever made by therapeutics was the use of Peruvian bark for malarial diseases. The dose was an ounce, and this was given in liquor or wine. If the stomach could be induced to retain it, the benefit was greater than had been derived from any previous medication. But what a dose!

In time pharmacy progressed to the production of an extract, getting rid of 450 grains of useless dirt, and reducing the dose to 30 grains. To this day there may be many devotees of the "ague stick," who cling to the cinchona extracts, even when deprived of quinine. The farmers of some sections carry this in their pockets and whittle off a chunk as their needs dictate. But all fetiches lose their sway as knowledge spreads, and in time the medical profession suffered itself to be persuaded that there was no benefit to be derived from an indeterminate quantity of inert coloring matter and resin; and finally quinine has completely replaced the older preparations.

Many attempts have been made to find a substitute, but to no purpose. The laity and the profession alike place their faith in it. There is the more reason that we should determine exactly what quinine will do and what are its limitations. Too much must not be expected of even so good a servant.

Manson says that a paroxysm once begun cannot be cut short by quinine; which he advises in the sweating stage, ten grains, with five grains every six to eight hours for the next two or three days. This is almost certain to prevent the third attack of intermittent. An aperient and rest in bed are invaluable aids, in cachectics and obstinate cases. When the fever has gone he gives iron and arsenic, with five to fifteen grains of quinine every five to seven days for six weeks. If the crescents are present he gives once a week a saline laxative and fifteen grains of quinine; iron and arsenic on the other six days. Too large doses of quinine may cause deafness—permanent—amblyopia, collapse, or fatal syncope. Children under a year should take half a grain at a dose. If the malady resists the doses advised, the diagnosis should be revised.

As quinine has caused miscarriage it should be given to pregnant women in minimum doses, three grains every eight hours for two days. There is more risk of miscarriage from ague than from this much quinine. The plasmodia awake to activity in the puerperal state so that during or after labor several five-grain doses should be given.

Quinine is best taken in solution; pills and tablets are apt to pass through the bowels undissolved if the tongue is foul and digestion disordered. It

would be well to substitute the hydrochlorate for the universally employed sulphate, the former being much more soluble in water. Manson advises to give quinine to children in a tablespoonful of milk, first greasing the mouth with butter. Quinine may be given by the rectum a few times, but it soon becomes too irritable to retain the drug.

In many cases it is best to inject the drug into the muscles. It is painful and may cause abscess, but the advantages outweigh these drawbacks. The acid hydrochlorate is soluble in less than its weight of water; the hydrobromate is nearly as soluble. The sulphate may be dissolved by adding half its weight of tartaric acid. The hypodermic dose is 10 to 15 grains, and in grave cases this may be given every 8 hours. Cleanse the skin aseptically, use sterilized water for the solution, and insert the needle deeply into the gluteal or scapular muscles. Not only is this an economic and effective way of administering quinine, but by it cases may be cured that resist the same remedy by the stomach. But the asepsis must be perfect—tetanus has followed injections of quinine.

In pernicious comatose remittents, where there is no time for other methods, Baccelli injects intravenously the following:—Quinine hydrochlorate 1 gram, sodium chloride 0.75 gram, water 10 grams. Of this he injects 5 to 7 grams and has reduced the mortality in these desperate cases from 17 to 60 per cent.

Warburg's tincture sometimes succeeds where quinine fails. It is a powerful sudorific. The coal tars relieve headache and fever.

How does quinine act? As it is destructive to free amœbæ it may be a direct poison to the plasmodia. Some say it stimulates the phagocytes, others that it paralyzes them. In man it causes quick disappearance of all plasmodia except the crescents. Sometimes it seems to awake a latent malaria and bring on a chill—as do hydropathy, sea-bathing and some mineral waters.

In severe forms such as bilious remittents, we cannot wait for the remission, but give fifteen grains of quinine at once. While it acts better after the bowels have been cleared out, the time is worth more than is gained by waiting for a cathartic. A full dose of calomel may be given with the quinine, and five grains of the latter every three to six hours till the fever has subsided. If bilious, the stomach should be cleared with ipecac or warm water before giving quinine. The usual expedients are employed to quiet the stomach; but if it will not retain quinine, clear the rectum and give 30 grains in solution by that route.

As in all other cases, hyperpyrexia demands the instant and energetic employment of cold—ice to the head, ice-water in the rectum, cold baths. Quinine should also be injected into the veins or muscles, five to fifteen grains



every three hours till 30 to 40 grains have been given. But the heat must be held at a safe point for four hours, till the quinine has had time to get to work. The coal tars are worse than useless (Manson). Use the cold bath whenever the axillary temperature reaches 106, and remove the patient when it has fallen to 102 in the rectum. Take temperatures every two hours and repeat the bath if needed.

For algid and dysenteric attacks Manson advises quinine and opium; ipecac for the latter; or saline and opium. But a hypodermic of atropine is so exactly indicated in the algid crisis that it should be given at once, in dose enough to send the blood back to the skin. Emetine will supply the place of ipecac and be far more likely to stay in the stomach.

**Hemoglobinuria:**—Koch agrees with many observers in our southern states that quinine is apt to induce this affection. It comes on even while the patient is cinchonized. In large doses quinine, being a protoplasmic poison, renders hemoglobin unstable and destroys red cells. If this is added to the destruction by parasites it may cause escape of hemoglobin by the urine. Bastianelli advises quinine if hemoglobinuria occurs during a paroxysm, the parasites being found in the blood; withhold it if parasites are not found; if given before hemoglobinuria and no parasites are found, suspend it; if they persist, continue it.

Calomel in very large doses is a favorite with many—a teaspoonful at a dose. Cases have recovered with neither calomel nor quinine. Quennec gave chloroform in 22 cases without losing one; 15 minims every ten minutes until some chloroform intoxication is produced, which is then sustained by chloral enemata. Tannic acid gr. 15 every two hours for four or five doses has succeeded when quinine failed, and especially in hemoglobinuria. Give also two doses each on the third and sixth days. Sodium salicylate is recommended. When anemia is profound, blood has been transfused with advantage. The most scrupulous care must be taken of persons who have had an attack of hemoglobinuria; they should go to bed at the least sign of fever, keep the skin warm, avoid drafts, and take plenty of warm drinks; if parasites are in the blood give quinine five grains by hypodermic every four hours, and a large dose of calomel. Fatigue, chilling, wetting, and all other causes of vitality depression, must be avoided. Cooling off in clothes wet with perspiration is dangerous. If the urine grows scanty avoid diuretics, apply heat to the loins, give water, and milk as a diet till the albumin ceases. Antipyrin and phenacetin are dangerous.

The place of arsenic is after the fever has been quelled, as a blood-restorer. Manson has never seen benefit approaching that derived from quinine, from methylene blue, phenol, iodine, anarcotine, analgen

phenocol, parthenium, ailanthus, chiretta, eucalyptus, or any other drug. Capsicum added to quinine seems sometimes to enhance its effects.

For the enlarged spleen Manson advises counterirritation with iodine or hydrarg. biniodide, with salines, quinine, arsenic and iron. Portal congestions are benefited by Kissengen or Carlsbad. Cachectics require removal to a salubrious residence, and great care to restore the blood.

The food should be light and fluid; lemons are much relished, boiled in water; in convalescence the nutrition should be increased.

The basis of prophylaxis is the extermination of the *Anopheles* and protection from its bites; drainage and cultivation, or complete flooding; filling in of stagnant pools; subsoil drainage with irrigation; good paving of towns. Build on high and dry places, yet sheltered with trees, covering soil with grass or cement; keep flower-beds away from bedroom windows; don't allow drain water to flow over the surface; don't keep water unchanged in tubs or tanks for mosquitoes to breed in; stock ponds with fish, or throw petroleum on them. Eucalyptus trees planted in malarial wet places dry the soil, and possibly the emanations keep away the insects. Sunflowers, chrysanthemums and other plants are said to be useful in some as yet unknown manner. If the soil must be upturned it should not be in the malarial season. Local traditions as to unhealthiness of locations should be respected; and the abdominal protuberances of the natives bear witness to insalubrity of a district. Suspicious water should be boiled before being drank; keep on the safe side. Keep in the house at night; sleep as near the roof as possible; use mosquito nets invariably; and especially compel malarial persons to use them to avoid infecting mosquitoes.

The difficulty experienced in winning popular assent to new theories is largely due to the inability of men to harmonize the new thought with their previous knowledge and views. Possibly this may account in part for the skepticism with which so many receive the statement that malaria and yellow fever are transmitted to man by the mosquito, and that in no other manner can these maladies be acquired by human beings.

The most stubborn resistance to that part that relates to malaria comes from adherents to the water-contamination explanation. The writer believes that these two views may be reconciled, and herewith presents the case:

Some years ago, a physician stated that he had attended the laborers employed in building the Yazoo railway. So many cases of malaria occurred among them that at one time it looked as if the work would have to be abandoned; but a complete change occurred when the use of the bayou water was forbidden, and that from artesian wells substituted. Thereafter no one contracted malaria except those who, despite the prohibition, per-



sisted in the use of the bayou water. This induced the belief that bayou water was the medium by which the cause of the disease was transmitted to the men; and this conviction remains firmly fixed in the minds of those who had so apparently conclusive a proof of its correctness.

But it is not always wise to accept such surface indications as demonstrated truth, for there may be other explanations of the phenomena. If the biologic study of the mosquito and of the malarial parasite show that only in the body of that insect is the life cycle completed, and the stage of the parasite's development reached in which it can enter the blood of man and give rise to the disease, the water infection theory must be incorrect, or else some part of the biology is yet unknown. Granting the correctness of both series of observations, there seems to be an *impasse*, but only in appearance, for there is a way to reconcile the difficulty.

For this purpose we will adduce another observation: In Alaska, where mosquitoes make men long for winter with temperature far below zero, it is found that the voracious insects may be kept at bay by applying to the skin a solution of *calx sulphurata*, provided the preparation be of full U. S. P. strength. Any other is uncertain and, therefore, should not be relied upon. The mosquito will not settle on the skin or bite anyone exhaling the odor of this unpleasant substance.

The water of artesian wells contains, as a rule, much more mineral matter than that from surface wells or springs; and among the mineral contents the sulphides generally are prominent. Memphis is supplied by such wells, and a number of them give water from which a strong sulphurous odor is exhaled. May not the immunity of the artesian-water drinker have been due to the fact that the mosquito would not attack him by reason of his body exhalations?

In the experiments made in Cuba with yellow-fever infected mosquitoes, it was noted that sometimes the insects would not bite certain persons. Why? No attempt was made, so far as I know, to answer this all-important question.

*Calx sulphurata*, commonly denominated calcium sulphide, has been employed as a remedy for various infectious maladies during the last few years by many practitioners. Given in doses of five grains a day and upwards saturation is produced in a few hours, as denoted by the exhalation of the characteristic odor upon the breath or from the skin. This saturation may be sustained for weeks, the medication being absolutely harmless to the patient, even when administered to adults in doses up to 50 grains *per diem*. If the doses are too large, nausea is caused. As a rule, it is best to give small doses, such as gr. 1-6 to 1-2, and repeat them every half-hour,

as by this means nausea is avoided and saturation secured with the smallest possible quantity of the drug.

When the body is thus saturated with the sulphide, in most instances, no insect can be induced to bite it—mosquito, flea, fly, bedbug, redbug, and, chigger, midge, black-fly or any other insect-pest with which the human race is tormented. The writer has kept patients saturated thus for weeks, in treating gonorrhea, tuberculosis, diphtheria, etc., and has never known any harm to result. Many enthusiastic advocates of the sulphides claim that no known microorganism can exist alive, in the body of a person thus saturated, therefore why may we not have in this both a preventive and a cure?

The sulphide should not only be taken internally, as above outlined, but should also be applied to exposed parts of the skin; for which purpose the following formula may be advantageously employed—Calx sulphurata, U. S. P. gr. 18; glycerin, 1 oz.; water 2 oz.; mix. This should be applied freely to all exposed parts of the skin before leaving the sheltered parts of the house, especially after sundown, and the application should be repeated every one to three hours as required.

One caution is essential—the sulphide (calx sulphurata) must be of good quality—full U. S. P. strength, carrying at least 60 per cent of the monosulphide. This drug is difficult to manage, decomposing spontaneously, and unless fully up to the pharmacopoeial standard should not be depended upon.

The ordinary drug on the market, both in powder and tablet form, ranges in strength from a mere smell all the way up, the U. S. P. shelf being very lonesome.

The problem of exterminating the mosquito is proving more difficult than at first apprehended. It has recently been announced that the insect finds a breeding place in the moist dirt at the base of leaf stalks, to which it is obviously impossible to apply kerosene. But if we cannot exterminate the last of the insects, there is no reason why we should not destroy all we can reach, for there is assuredly less danger from a few than from millions. Let the swamps be oiled, then, and the tanks kept covered, and the open drains shut in, and each householder instructed as to the danger from standing water to which the insects may obtain access. The sick must be carefully protected from mosquitoes by screens that there may be no infection of insects to carry the disease further. Window and door screens should be added to the bed-canopies in universal use, and fumigation by burning insect powder and niter employed to destroy or drive out any that have obtained access to the rooms.

Duncan found no prophylactic value in arsenic, but quinine three to five grains a day reduced the number of cases one-half. Corre found it

did not prevent pernicious forms. Celli speaks well of methylene blue as a prophylactic. Manson considers tea, coffee and small doses of alcohol of service; the last only after the day's work is done and there is no reason for going again into the sunlight. Crudeli praises lemon decoction.

Three methods may be employed to break up the chill:—A hypodermic of pilocarpine gr. 1-6, enough to cause free sweating and thus advance the paroxysm to that stage. This is useful in hyperpyretic forms and many others, the only contraindications being extreme debility, collapse and pulmonary hyperemia. Next, a hypodermic of atropine gr. 1-134 to 1-67, to which brucine gr. 1-20 to 1-10, or strychnine gr. 1-30 to 1-20, may be added if the debility is extreme. This is especially indicated in the algid form, where intense cutaneous vasomotor spasm is to be quickly unlocked, and failing vitality revived. It is also to be used in hemoglobinuria, where strychnine has given the best results of any remedy as yet reported to us. Full doses are essential; and the physician who does not comprehend dosage for effect has no business treating pernicious malarias.

The third method is the use of chloroform by the stomach, which has been already described. The local effect of chloroform on the stomach is powerfully stimulating, and to this rather than its toxic action the benefit is probably due; though as a relaxant of spasm it acts also as atropine does. It is best given in either pure alcohol, or with capsicum, ginger, camphor or other revulsants, to get the greatest local stimulant effect. "Bring the tears to the eyes." Give the hottest thing at hand, undiluted.

Reports from very many American physicians indicate the absolute necessity of keeping the alimentary canal clear and aseptic, the elimination free. "To neglect the liver is simply suicide here," said an old physician from the Carolina rice fields. Many cling to calomel because they have learned to know, use and trust it; but a grain of emetine will clear the liver thoroughly without salivating. But so great are the advantages from emptying the bowels and giving zinc sulphocarbolate, that many believe this as essential as quinine.

Excepting possibly in the severer acute attacks, it seems likely that the arsenate of quinine in doses of a grain a day equals ten to fifteen grains of the sulphate. If so, the smaller dose and freedom from objectionable features of big doses are worth considering. But in the dangerous fevers of the tropics give quinine to effect. The last case of this seen by the writer was in consultation with the late Prof. William H. Pancoast, in the person of a physician just returned from the Chagres district. The symptoms indicated the so-called "malarial" yellow fever—bilious remittent. He got quinine in doses of 20 grains. Next day his temperature reached 105° F., and the quinine was raised to 40 grains. That

night the physicians were called in, as the thermometer showed 106.5° F. The quinine was raised to 60 grains, given by the muscles and rectum, and next morning he was convalescent. But such doses are not to be given heedlessly or needlessly. This world is full of doctors who seek reputation as "terrible fellows," by giving such doses to any ordinary case of ague, and bragging about it afterwards. One of the writer's patients had been rendered permanently deaf by such a dose, administered in Cincinnati, by a prominent teacher of therapeutics.

In India the practice for enlarged spleen is to rub into the skin over this organ a lump of *ung. hydrarg. biniodidi* as large as a bean, and then expose the naked skin to the rays of the sun or of a hot fire. In Germany the patient is placed in a hot bath, and a half or quarter-inch stream of very cold water is directed against the skin over the spleen, under the hot water. Hypodermics of ergotin have been vaunted. The most effective method is the use of the indicated remedy, berberine, which contracts relaxed connective tissue. Give gr. 1-6 every two hours, for a month; with a full daily dose of quinine arsenate, keeping the bowels clear and aseptic. The dose of berberine may be raised to 20 grains a day if necessary, but there is much benefit in the steady, persistent administration of small doses.

The writer believes it best to give quinine in divided doses, so that there shall not be a moment in which the blood is not so charged with it as to render it impossible for the parasites to mature in safety. No matter how large the single dose, it will only act on those that are in an unprotected stage of development, and the rest will remain to propagate.

Has the tremendous stimulation of leucocytes caused by pilocarpine any value in multiplying the defenders of the body? If so, how about nuclein? Now that study of the plasmodia has given us some certainty as to diagnosis, and a means of testing scientifically the progress of the malady and the effect of remedies, we may begin to study the therapeutics with some better means of judging than the recovery or death of the patient—an event that may be *post hoc* or *propter hoc*.

Burggraave called especial attention to the larval forms, in which the malarial attack assumed the aspect of some organic malady—gastritis, meningitis, apoplexy, lumboabdominal neuralgia, etc. In the cold stage he gave strychnine arsenate or sulphate, a granule every quarter hour, with hot aromatic drinks. Mustard should be applied over those parts on which the disease seemed to fasten itself; and general frictions used, the patient being warmly covered. In the hot stage, with fever of 102° to 104° F., he gave aconitine with strychnine, a granule each every fifteen minutes, with warm aromatic wine. Headache he relieved by applying



vinegar to the forehead. In the sweating stage the bed should be changed; plenty of fresh air and nourishing diet secured; abundance of quiet repose; and during the apyrexia, with regularity and constancy he gave quinine arsenate, sulphate or hydroferrocyanate, and strychnine arsenate; one or two granules of each every quarter or half hour. The same treatment suited larval forms, with dry cups for pain.

For the dysenteries of malarial localities he advised mineral acids, with quinine arsenate and hydroferrocyanate. Ipecac and mercury he considered apt to aggravate the weakness and local disease.

In paludal anginas and diphtherias he gave calcium sulphide and acids, especially lemon juice, with quinine.

Diathetic paludal gastralgias were quieted by quinine, strychnine and hyoscyamine, a granule each until sedation was obtained.

Gabriel Viaud, in a suggestive paper on the malaria of cities, enumerated the disadvantages under which the citizen labors, and the inevitable effect on his endurance, especially the lowering of vital resistance. He says: "To combat this permanent infection of the organism of the inhabitant of the city, this fever palustral, this malaria endemic, we have really efficacious therapeutic resources. In the unhealthy provinces of Lombardy the living elements of the paludal fever are neutralized by the alkaline sulphites and by arsenic. Tommassi Crudeli has shown the good effects of arsenic on populations exposed to malarial effluvia, the active agent of paludal infection. It has often been remarked in the home of malaria, that after arsenical treatment the fevers recur more rarely than after treatment with quinine, and even that individuals cured by arsenic often enjoy a durable immunity against renewed aggressions of the malaria. Other Italian physicians have obtained the same results in the Roman Campagna, the Tuscan Maremma, and the Italian *pouille*. It is possible then to put the human organism in a state of defense against the malarial infection by means of medication, let it be arsenical, sulphide, or tannic. The essential is to impress upon the internal physiologic *milieu* such a modification that the germ of infectious disease is not cultivable there. This prophylactic medication is rendered very easy today for the toxined inhabitant of cities, grace to two heroic remedies, embodying marvelously the properties of the sulphide and arsenic, so vaunted in Italy, the land of fevers—calx sulphurata and strychnine. All experiments made, all clinical facts scrupulously observed, prove that progressive impregnation, arsenical, sulphidal or strychninal, is the best preventive of grippal affections, influenza, malaria and all general urban infections. When one is under obligation to live with his pathologic enemies in cities, to sojourn in human marshes, in the midst of all the infections engendered by the



agglomerations and the excreta of social life, what is more indicated than to prefortify against fevers and possible complications by internal sterilization of the tissues? What more rational than to place oneself under the palladium of strychnine and calcium sulphide?"

## DYSENTERY

Dysentery prevails sporadically in all parts of the globe, in the tropics extensively, occurring as an epidemic in temperate regions. It is still a common camp disease, and was frequent in institutions, but has become less so. It becomes more frequent and severe as we approach the equator. Its habitat is similar to that of malaria, prevailing in low, wet places, and mostly at the close of the summer. Drainage dissipates both. Both may occur in the same person at the same time, and each predisposes to the other.

But this resemblance is superficial; each prevails without the other and the specific cause is totally different. Shiga discovered a bacillus in the dysentery of Japan to which he attributed that disease, and this has been detected in the same malady in the Philippines, Porto Rico, Germany, England, and in cases of cholera infantum in this country. Whether this is the only organism capable of inducing inflammation of the mucous membrane of the large bowel is another question.

The bacillus dysenteriae is as long as that of typhoid fever, growing on all culture media, gelatin colonies assuming the shape of a grape leaf. It does not liquefy gelatin, ferment sugar or coagulate milk. It is at first slightly motile. Fed to animals, it has no effect unless the mucosa is already irritated.

Dysentery caused by this organism may occur sporadically or in epidemics. In the Philippines it appears about the end of the rainy season. The infection is believed to enter with the drinking water. The incubation is within forty-eight hours. The onset is abrupt, with fever, abdominal pains and frequent calls to stool, the first discharges being fecal, then intestinal mucus, and then blood, pure or mixed with the preceding. The stools are small and straining becomes incessant. The pulse is fast and tends to become small, as the fever rises to 104° F.; the tongue is coated and dry; the thirst tormenting; as the body is drained of fluids it shrinks, and the face becomes small and pinched. Grinding pains in the abdomen add to the distress, which becomes acute; delirium sets in, the prostration becomes extreme, and the patient may die in two or three days.

In less severe cases the symptoms are not so acute, and begin to subside in a few days, the tenesmus and tormina lessen, the temperature falls, and recovery ensues within two or three weeks.

Subacute and chronic forms prevail, when the case drags along for months, the patient becoming excessively thin and weak, with several stools a day, mostly in the morning.

In the acute form the mucous membrane of the colon is swollen, very red, with raised folds. Ecchymoses are found, and much or little of the surface of the mucosa may be neurotic. All the coats may be infiltrated, gray to black, necrotic or even gangrenous. The ileum may also be hyperemic. In subacute cases there is less swelling and the solitary follicles project. The mucosa is less deeply involved.

Many writers now describe amœbic dysentery as a distinct form, dependent on the amœba dysenteriae. This is found in the mucus, any little flake presenting it in abundance. It is about 20 micromillimeters in diameter, with a clear outer zone or ectosarc and a granular inner zone or endosarc, a nucleus and vacuoles. The movements are those of any amœba. They may contain red blood cells. The slide should be warmed in cold weather. Manson denies this as a specific cause of dysentery, though he acknowledges that it is frequently found in the stools and the tissues, as well as in the pus from hepatic abscesses. But he has repeatedly failed to find the amœba in typical cases, and an amœba indistinguishable from it is found in the stools of healthy persons; while Gasser could trace no relation between the number of amœbæ present and the severity of the attack. Amœbæ of many kinds abound in countries subject to dysentery, and at least six other varieties have been found in dysenteric stools. Meanwhile this malady has been confidently attributed to various organisms, such as bacillus coli commune, streptococci, bacillus pyocyaneus, Durham's micrococcus, etc. It seems likely that it will eventually be acknowledged that no one organism possesses a monopoly of the power of exciting inflammation of the large bowel, as has been shown to be the case with the lungs.

Amœbic dysentery is thus described by Osler: The onset may be acute, with the symptoms already described, the fever not high; sometimes large sloughs pass; emaciation is rapid and death may occur within a week. There may be hemorrhages, or perforation and peritonitis; recovery in most cases, or the disease may become chronic. Extensive ulceration may cause chronic diarrhea, the case ending by exhaustion in three months. Equal emaciation is seen only in cancer of the esophagus and in nervous anorexia. Corneal ulcer may occur. Or, the attack may be subacute, becoming chronic, with alternating constipation and diarrhea; the latter attended with fever, pain, straining and mucosanguinolent stools. In the temperate zones the extreme emaciation described is not common; the appetite is capricious, digestion unsettled, and slight errors

of diet are followed by diarrhea. The tongue may be red, glazed and beefy.

The most common form of dysentery seen in the northern United States is the catarrhal. This may begin as a diarrhea, the stools becoming less in bulk and more frequent, with griping and straining. The stools contain about a tablespoonful of mucus, with specks or streaks of blood. The desire to evacuate the bowel becomes incessant, the feeling being as if a lump were there to be strained out—the inflamed bowel. There is less fever than with an equal extent of inflammation elsewhere, but the suffering may be extreme.

In other cases the onset is abrupt and the symptoms supervene rapidly, the severest type being manifest in a few hours. Still there is little fever, though the patient remains constantly on the commode. The tenesmus extends to the bladder. Thirst is great. By the end of the week the symptoms have subsided and we have recovery or the chronic stage of the disease.

If the mucous membrane breaks down and loses its vitality we have the severe symptoms persisting, the stools become offensive from the presence of sloughs, and the loss of substance entails a tedious recovery while the gaps are filled up—if they do so at all, and do not sink into a chronic ulcerous state. Chronic dysentery may last for years or the healing ulcers may leave cicatricial obstruction of the lumen of the bowel. Prolonged disability results at any rate.

The worst form of acute dysentery is the fulgurant or gangrenous. The stools resemble the washings of beef, depositing a coffee-ground material, exceedingly offensive. Dark sloughs are passed, with rings or tubes of membrane. Collapse supervenes rapidly, with cold extremities, algid face, small thready or imperceptible pulse, cold sweat, husky or inaudible voice, hiccough, low delirium, and generally death.

Hemorrhage is an accident, from the erosion of an artery in the separation of a slough. Intussusception is another accident, sometimes occurring in children. There is a sudden increase in the pain and straining, absence of fecal matter from the stools, vomiting, and a tumor to be found by rectal examination.

Some abdominal tenderness is common, and the colon may be felt to be thickened. The liver is enlarged and tender, hepatitis may alternate with dysentery—often ending in abscess. Multiple abscesses are always fatal.

The mortality from dysentery depends upon the nature of the epidemic, the condition of the patient and his care and surroundings. With bad hygienic elements and bad treatment it may become terribly destructive

of life. But even in India the mortality among Europeans is given as but 22 percent as a maximum, while in Japan it is 7 per cent and in Egypt 40 per cent.

The sequels are more dangerous than the disease. Chronic ulcers with cicatricial obstruction, general atrophy of the intestinal, glandular and absorbent systems, wasting, asthenia, failure of digestion and assimilation, too often continue through the patient's remaining life. Hepatic abscess may occur during or months after the dysenteric attack. Here it usually comes on insidiously. Malaria is a not infrequent complication. During the Civil War typhoid often coexisted. Rheumatoid arthritides are occasionally present, probably septic or autotoxemic. Serous inflammations, pyemia, pyelophlebitis, chronic nephritis, non-renal edema, paralysis and digestive failure, are more or less frequent sequels.

The diagnosis is easy—the frequent, small, mucous and bloody stools, tormina and tenesmus, slight fever and severe suffering, suffice. Rectal ulceration, syphilis and cancer cause straining and bloody stools, but their onset is gradual and their history different. The gangrenous or diphtheritic form has been mistaken for typhoid fever, but blood does not appear in the stools of the latter until later, there is a swelling of the spleen, the rose rash, and the Widal reaction. The amœba can easily be detected in stools of that form, which is also distinguished by its irregular course and tendency to chronicity, the ambulant habit of the patient and tendency to hepatic abscess. Leucocytosis is to be expected only during complications. "In the acute specific form the blood-serum agglutinates the Shiga bacillus" (Osler).

**Prophylaxis:**—The position of those who insist on the dissemination of the germs of dysentery by water is markedly strengthened by the diminution in the number of cases developing when the use of pure drinking water is made compulsory. Persons residing in infected districts should drink no water unboiled, or without the addition of potassium permanganate. Infection by dust, flies, utensils and food, should be avoided. Fruit that is unsound, and other food that might excite diarrhea, may not give rise to dysentery but at least they open the door to it. The presence of the amœba in the stools of healthy individuals does not so much disprove its etiologic importance, as it shows that a suitable soil is also essential. In tropical lands the woollen abdominal bandage is highly prized by intelligent residents. Persons reduced by pre-existent disease, by privation, scurvy, malaria, alcoholic and other excess and dissipation, or weighed down by grief or anxiety, are more likely to have this disease and to have it in worse forms, than persons in good mental and physical health. No age, sex or occupation is exempt; nor is any race in itself and apart from its habits immune.



**Treatment:**—What are the objects of treatment? First and emphatically not to stop the discharges. This idea has cost many lives. The writer has seen men die of dysentery, their bowels locked up by opiates and the pupils tightly contracted. Evidently it was not the frequency or size of the intestinal discharges that killed them. The first object of treatment is to moderate the violence of the inflammation so as to preserve the life of the affected tissues; next to sustain the vital powers until the storm is past, and third to prevent autotoxemia.

Empty the inflamed bowel, cleanse it, make and keep it aseptic, deplete the swollen tissues and cool their virulent heat.

Begin with calomel gr. 1-6 every half hour for six doses; follow with small doses of a saline laxative repeated every two hours. This will remove all fecal matters—which assuredly are not good for an inflamed bowel—and deplete the swollen tissues without irritating them. Frequently constipation exists in the upper bowel while dysentery rages below it. The saline should be given several times a day, in doses too small to irritate, throughout the attack. Keep the upper bowel aseptic by zinc sulphocarbolate gr. 2 1-2 every two to four hours also—it is not good to allow a diseased tract to become poisoned by toxic decomposition products, nor to allow the blood to become deteriorated by toxin-absorption from the alimentary tract.

The inflamed colon and rectum are within the reach of local remedies. Irrigate the colon with physiologic salt solution, as hot as can be borne—and this is hotter than the nurse's hand will bear in many cases—and there will be a notable diminution of the tenesmus and the inflamed tissues will be soothed and depleted. This may be repeated as often as the patient desires—he will know when the irritation has returned. If the malady hangs on, a grain of silver nitrate in each half pint of hot water will be useful. Even in the height of the inflammation this has a most gratefully soothing effect, and many prefer it to salt water. These injections are best given with the patient lying on the back with the hips raised. The tube should be well lubricated and introduced with the utmost gentleness, allowing a little water to flow in when the point is caught. If there is much involvement of the rectum it will be best not to try to introduce the colon tube but to make frequent half-pint rectal injections with the silver, until the irritation there has subsided.

Keep the patient at rest, in bed. Insist on the use of a bedpan, and forbid straining. Tell the patient it is the inflamed bowel that feels so like a foreign body, and that it cannot be strained out but that this will make the inflammation worse, and he will obey better than if no explanation is vouchsafed him. The food should consist of articles wholly digested in the stomach, and affording as little waste as possible. The raw white of

egg, beef and oysters, the beef powders predigested, bovine, and juices freshly pressed from sound ripe fruits, are best. Hot milk and *café au lait* are excellent. Later, any clear nutritious soup may be added, but starches should be withheld till convalescence is well established. Plenty of pure water should be given. Alcohol is always injurious, even in those accustomed to its daily drinking.

Ipecacuanha was first introduced as a marvelous remedy for dysentery. It has been used with success and repeatedly allowed to fall into desuetude, but still stands at the head of remedies for the severer forms of this malady. Especially in India it has been widely employed. It soon became evident that the virtues of this remedy did not depend on its emetic properties but were developed best when emesis did not occur. Efforts were made to secure the specific effects by excluding the emetine, but with unsatisfactory results. It was not then known that ipecacuanha contained two alkaloids, the acrid emetic cephaeline, and the milder cholagogue emetine on which the specific virtues of the plant in dysentery depend. There is little emetic tendency about emetine unless it is given dissolved in a large quantity of warm water. To avoid nausea let the emetine be taken in tablets, swallowed whole, without chewing, or liquid, and have the patient lie absolutely quiet for fifteen minutes or longer after each dose. By this time the dose will be dissolved, absorbed as quickly as dissolved, and no nausea will result. If the stomach is unusually irritable inject morphine gr. 1-8 over the epigastrium just before giving the emetine.

The average dose is one grain of emetine, and this may be repeated in two, four or eight hours, according to the gravity of the case. In many cases the patient will fall asleep within fifteen minutes of taking this dose, sleep eight hours, and on awaking pass two spinach-colored stools, and be convalescent. Smaller doses then suffice. The writer has employed this method in all forms of dysentery, in the tropics and the temperate regions, and has found no other treatment as effective.

How does emetine act? We do not know, but believe the effect will prove to be associated with its cholagogue action. Many physicians have advocated mercury in various forms, principally corrosive sublimate, following Ringer, giving about gr. 1-134 every hour or two. This may have some antiseptic effect, or it also may act in stimulating the secretions of the digestive system, as emetine does. Veratrine has also been advised, in very small doses, gr. 1-500 to 1-134 every two hours. It performs its certain functions of relaxing tension, equalizing circulation, and opening the doors for elimination universally. Given judiciously in the doses mentioned it will not increase the irritation but allay it. The specific  
lication for veratrine is probably defective renal excretion. In ordinary

dysenteries there is not usually enough fever to render it a leading indication, but the hyperemia of the affected tract requires relief as elsewhere; and this is best accomplished by the local treatment, and emetine.

The writer has employed bismuth very largely, in all forms, and finds it useful as a topical application to allay inflammation. It is best given in suspension by enema, in full doses—one to four drams in half a pint of mucilage. But it is doubtful if it offers much advantage over hot water used judiciously.

Osler commends in the amoebic form warm enemas of quinine solution, 1 to 5,000 or 1,000. He has seen no bad effects from large enemas. Hot applications to the abdomen are grateful, the clumsy and heavy poultice being well replaced by a Japanese muff-warmer wrapped in flannel.

In the malignant form, where the symptoms in a very short time develop the utmost intensity, it is necessary to arouse the vital forces with the speediest and most powerful of stimulants. In the sudden attacks common in the tropics, taking the form of dysentery, cholera morbus or pernicious chills, there is in India a proverb that if the tears can be brought to the patient's eyes he may be saved. For this purpose mixtures are made resembling the following: Chloroform, *sp.* camphor, oil of cajeput, *tr.* capiscum, of each two drams; ether an ounce. Of this a teaspoonful is given, undiluted, and repeated in ten to thirty minutes if necessary. It is quite effective, and by it many an attack of this kind has been broken up in a few hours. As time is precious in such cases an extemporaneous mixture can be made with the remedies at hand—ginger, red pepper, camphor, "pain killer," Hoffman's anodyne, sweet spirits of nitre, or the contents of the family spice-box. The one essential is that it be hot enough to "bring the tears to the eyes," and given promptly, before the damage has been done.

Manson advises calomel when the ipecacuanha and saline treatment has failed and bloody mucous stools persist; giving a grain with ipecacuanha and opium every six hours. In Germany also this remedy is favored for membranous cases. But the writer does not see why there should be need of such treatment if emetine and enemas are intelligently employed. It is a poor sort of a doctor who is ever "trying" remedies. As one becomes accustomed to positive medication with therapeutic certainties, he gets out of this vicious method of tentative medication, timorously administering drugs without any real knowledge what result to expect, but simply a vague hope that the patient may be better after taking them.

Manson says that simaruba—*Ailanthus glandulosa*—has succeeded when other remedies have failed; but it must be given in much larger than pharmacopoeial doses. Half an ounce is advised every second morning



for four doses. Maberly advocates a South African plant, *Monsonia ovata*, as giving wonderful results. Cinnamon, pomegranate, mangosteen peel, and other drugs have been used with advantage. As regards cinnamon, it has useful properties not often suspected by those who look on it as merely a carminative. The writer has used it with great benefit in menorrhagia, giving two drams of the spirit at a dose. In chronic cases of dysentery it may be likewise effective in large doses.

In chronic cases Manson advises a course of ipecacuanha, followed by silver nitrate locally. Clear out the bowel by ipecacuanha, salines, calomel, castor oil, rest and diet for a week at least; then give a minute dose of castor oil and a large enema of warm water, with two or three teaspoonfuls of sodium carbonate to two quarts of water; when this has passed leaving the bowel quite empty, throw in two to three pints of silver nitrate solution, half to one grain to the ounce of distilled water; using a fountain syringe and colon tube, the patient lying on the back with hips raised. The injection should be retained as long as possible, and repeated every few days. Osler says that no case of argyria has been known to result from these silver injections. If improvement does not follow immediately, or if the irritation is increased, the injections must be stopped.

Chronic dysentery may be cured by the strict stomach diet, silver locally, and intestinal antiseptics, rigidly persevered in for three months. The writer does not personally know of cures resulting from any other method.

After an attack has subsided constipation is frequently annoying. The morning dose of saline laxative, with careful diet, and an occasional flushing of the colon with mild antiseptic solution, will answer every useful purpose. But the enema habit is to be avoided, and the saline reduced daily as the habit of regular evacuations is restored.

The value of the abdominal binder is acknowledged by those who use it properly; others are skeptical. It should be of all-wool flannel, and made to cover the abdomen from ribs to brim of pelvis, held smoothly by crinoline or other stiffening; and worn through the day only in all seasons.

The writer firmly believes that the best way to prevent hepatic abscess is to keep the alimentary canal as nearly aseptic as is possible.

Balard D'Heronville details the case of a man of 24 years, a gardener, recently arrived from military service in Algiers. He had had an attack of violent dysentery for two days. Three days' constipation preceded the outbreak of dysentery. This, with general malaise, headache and obstinate saburral dyspepsia, frequently precede dysenteric attacks in hot countries. The abdominal symptoms were violent colics, frequent evacuations of stools, serous, greenish, slightly sanguinolent, with glairy lumps mixed with scrapings from the bowel, and tenesmus after each stool. With this a pro-

nounced anemia, the transparent skin beaded with profuse sweats, temp.—36.8 C., completed the picture.

He prescribed rice water and rhatany, woolens and opiate poultices over the hypogastrium. Absolute diet. Next morning the patient reported a little more sleep, temp. 37 C., stools as frequent, tenesmus more painful, feces not improved in appearance. The prostration persisted. Prescribed bismuth and opium, with three lukewarm general baths during the day. "That evening the father sent for me in great haste; his son showed great weakness; he 'flanked' (flunked?) I could not hesitate to admit that in view of the infectious malady the medication and hygiene were incompetent to cope with the trouble. The temperature was 36.4 C., the stools more strongly sanguinolent and more and more frequent. I thought of ipecac in large doses, and of glycerin a dessertspoonful every hour, employed with success in China where dysentery is common among the European colonists; but it was night, and I postponed till morning these remedies. But I sent the patient a vial of calcium sulphide granules, with directions to take one every half hour, continuing the former prescriptions.

"At the earliest hour I was at the bedside of my patient, whom I found to my surprise in a better state. He had taken twelve of the granules, then slept. Only two stools since last night's visit; temp. 37.3 C. I confined myself to the sulphide, a granule every hour; directing the attendants to watch the effects, continuing the bismuth and baths. Three days later he arose and began a brief convalescence. Quinine and strychnine quickly removed the debility. When the patient came to pay his bill, he said: 'M. le Docteur, do you see, it was those granules that cured me; without which I would have passed over to the left.' And that is how your servant became a dosimetrist, and a convinced partisan of calcium sulphide."

## CHOLERA

The wings of cholera have been clipped by the health officer. Since 1873 there has been no prevalence of the malady in America, and no serious epidemic has prevailed in the last fifty years. In 1893 a few cases were imported but the disease failed to gain a foothold.

The specific cause of Asiatic cholera was discovered by Koch in 1884, in the comma bacillus. It is a bent rod, thicker and shorter than the tubercle bacillus, sometimes occurring in a spiral shape. It is a spirochæte. It has been found in the water tanks of India, and in the water of the Elbe during the Hamburg epidemic in 1892. It may be found in the intestines of persons suffering with cholera, in the earliest stools, and very plentifully in the rice-water dejecta, and rarely in the vomit. Even in

The stools of persons not choleraic they are present during a general epidemic. In the most rapidly fatal cases they have not time to penetrate the intestinal walls and glands. To produce this disease in guinea pigs it is necessary to neutralize the contents of the stomach and to paralyze peristalsis with opium.

The symptoms are due not to penetration of the blood or tissues by the bacillus but to absorption of its toxin from the alimentary canal. As long as the intestinal epithelium is intact no absorption takes place.

The blood serum of men or of animals who have recovered from cholera contains a substance that causes rapid destruction of the comma bacilli. It is not an antitoxin. Haffkine has employed this serum as an immunizing agent in India with success.

Certain conditions are necessary to render the comma bacillus when swallowed infective. Contagion is slight; attendants are rarely affected. Laundresses and those who come in contact with the stools are especially liable to contract cholera. The custom of watering growing vegetables with diluted sewage is responsible for many cases, especially such plants as are eaten raw. Milk takes up the infection. On bread, meat and butter the bacilli live for a week. In flies they survive at least three days, and these insects are probably a frequent source of food infection. Dry bacilli die in a very short time. Water is the chief medium of infection, as used for drinking, preparing food or washing. Infection of the water-supply causes the great epidemics. Then there is a sudden explosion of the disease, numerous persons being attacked simultaneously. In other cases the malady spreads from individuals, and cannot always be traced. This water-contamination theory meets with some dissent, and observers in India found comma bacilli in water-tanks after the epidemic had ceased, as plentifully as during its prevalence.

Cholera has always followed the lines of travel. Formerly it spread at the ordinary rate of a man's progress, and this fact has been woven into the legend of the Wandering Jew. But since steam has given wings to man the cholera bacillus has also availed itself of more rapid means of progression. The seacoast and low lands are more affected than high altitudes, possibly because more exposed and the population greater. The disease is more prevalent during or near the close of the hot season. All ages are liable, the intemperate and feeble more so; fear has an influence in predisposing, also grief and kindred depressing emotions. Any disturbance of digestion, weakening resistance or injuring the intestinal epithelium, probably opens the door to cholera.

"There are no anatomic characteristics." Comma bacilli may be found in abundance in the bowels after death. High temperature may

follow death. Rigor mortis sets in quickly and may cause muscular movements. The body is drained of water, the blood thick and dark, tissues shrunken, peritoneum sticky, intestine congested, thin and shrunken, containing a fluid like the stools. The mucosa is swollen, hyperemic in acute cases, congested most in Peyer's patches, denuded of epithelium. The spleen is small, the liver and kidneys show cloudy swelling, the renal epithelium is eroded, heart flabby, right side engorged, left empty, lungs collapsed and congested at the base. When death is postponed until reaction there are evidences of intestinal inflammation. At first the stools contain only the comma bacilli; later other organisms accompany them.

Incubation lasts three to five days. The first stage begins with diarrhea, painless, sometimes so slight that the patient is simply conscious of an easier stool than usual. Or, there may be nausea, colicky pains, headache, depression of strength and of spirits. This may continue a few hours or days. During an epidemic all diarrheas are to be considered choleraic and measures taken accordingly. With the general diffusion of the cause an outbreak simply depends on the concurrence of favorable conditions, and an ordinary diarrhea will supply these. Some leucocytosis is present, the large mononuclear cells being abundant.

After this preliminary stage or without it, the symptoms of cholera asphyxia may set in suddenly. The diarrhea becomes profuse, the stools at first fecal but soon assuming the characteristic "rice-water" appearance. Cramps and tenesmus occur with incessant purging. Prostration is rapid, the patient shrinking in a few hours to a shadow of his former rotundity, and collapse supervening with ashen features, cold skin covered with clammy sweat, eyes sunken, nose, fingers and toes blue, cheeks hollow, voice a husky whisper, pulse threadlike or imperceptible, axillary temperature subnormal, rectal perhaps elevated. Consciousness is undisturbed but lethargy comes on, deepening into coma. Cramps occur in the muscles of the calves as the blood becomes thick from the deprivation of water. The rice-water stools contain flakes of epithelium and mucus, sometimes blood; they are all alkaline and devoid of odor. The saliva ceases, urine is concentrated and scanty, sweat abundant, and in nursing women the milk may be increased. Death may follow the outbreak in two hours, or within a day. Sometimes the toxin is so concentrated that the patient dies quickly without any diarrhea. These cases are known as cholera sicca. The urine contains albumin and granular casts.

Should the patient survive this onslaught the stage of reaction sets in, termed cholera typhoid. In this we see the results of the disease. Warmth and color return to the skin, perhaps with a rash; the pulse becomes full and stronger, the kidneys secrete, diarrhea and vomiting subside, cramps cease



and temperature rises above normal. This may soon pass into convalescence, but if the attack has been a serious one the effect is soon manifested in a dangerous enterocolitis. The patient becomes very weak, the pulse feeble and fast, tongue dry, and delirium sets in, usually of the low, muttering typhoid type. The stools become fetid and may contain blood. The urine may be suppressed, the tubuli uriniferi blocked by detritus, acute nephritis or uremia developing. Stupor supervenes and ends in fatal coma.

All grades of severity are met in an epidemic, from those that do not go beyond diarrhea—termed cholerae—to the dry cholerae.

Among the sequels diphtheritic affections of the bowels, throat and genitals are not rare. Nephritis, pleurisy, pneumonia, abscesses, suppuration of the parotid and local gangrene have been observed. Cramps in the extremities sometimes persist for some time.

When Asiatic cholera is epidemic it can only be diagnosed from cholera morbus by the bacteriologist. The symptoms differ only in degree. Arsenic, corrosive sublimate, corrosive zinc salts, muscarine and the poisonous amanitas cause symptoms closely resembling cholera.

The mortality varies between 30 and 90 per cent. It is greatest in the beginning of the epidemic; and in persons debilitated by intemperance or preëxisting disease. The aged die. A sudden and violent onset is fatal; cholera sicca hopeless.

When an epidemic of cholera is threatened preparations should be made by cleaning up the ports and cities where it is most likely to enter.

As infection is given off only through the stools, and taken in only by the mouth, the rules of personal hygiene are obvious. Stools should be thoroughly destroyed, and as acids are deadly to the comma bacillus, an ounce of any of the strong mineral acids in the vessel will accomplish this, if left to stand an hour after each stool is passed. Linen that has been worn by the patient should be well soaked in any acid that will not injure its texture, such as crude pyroligneous acid; or it may be burned if the acid is not at hand. The nurse must rinse in acid solutions her hands, the dishes, and everything used in the sickroom, before allowing them to be taken from the room.

Unneeded persons should be sent out of the dangerous region—the fewer the individuals who are food for the epidemic the less extensive it will be. This does not apply to those who already have the infection, for they would spread it wherever they go. Such persons should be sent to a detention camp, and retained there under observation until they are surely free from danger. Those who must remain in a city stricken with cholera should refrain from taking into their mouths any food or drink that is not cooked or boiled, or acidulated. Fruit eaten from the stands

and well powdered with street dirt may be infected; no one can tell where or how the drinking water may be polluted; and as only those who take risks contract the disease, it is easy to keep out of its clutches by not taking risks. Even the simple precaution of adding lemon juice to the drinking water will suffice, as all acids are fatal to the comma bacillus.

**Treatment:**—The slightest sign of diarrhea calls for immediate treatment; and this malady differs from other diarrheal affections in that it is absolutely necessary to lock up the bowels at once. The advice of Sir George Johnston, to begin with castor oil, reappears in the newspapers every time cholera comes into prominence. It sounds like common sense, to sweep out of the bowels the offending matter; and the unquestioned utility of this method in ordinary diarrhea adds to the force of the advice. But Asiatic cholera is not an ordinary diarrhea; and in India, where the suggestion was fully tried, it proved so deadly that it was given up. This is one of the very few things in medical practice that is definitely settled.

Lock up the bowels, then, with a full dose of morphine, hypodermically. There are many mixtures on the market that are useful, because they depend on morphine for their main effect—compounds of camphor, capsicum, chloroform, etc. It is best to give exactly what is needed and not to obscure the lesson by enveloping the remedy in a mess of others. Give enough to keep the bowels closed, and repeat so as to keep them so till the danger is passed. Feed with fluid foods that will be digested in the stomach and leave the bowels at rest—raw egg white, beef and oysters, grated hard boiled yolk of egg, fresh hot milk, and coffee, with the pre-digested foods, sanguiferrin and bovine. Meat powders like somatose should be extremely useful here. Give small quantities every two hours.

If the symptoms of the second stage develop, with collapse and rice-water stools, the remedy is atropine in full dose, hypodermically. Give gr. 1-67, and repeat in an hour if the blood has not returned to the skin; then often enough to keep it there. It directly antagonizes the symptoms of the disease through their whole extent, by sedating the excited vagus.

Harkin, of Belfast, who introduced this treatment, had remarkable success with it in India, where he went to put his idea to a practical test. Atropine is the best remedy for the vomiting as well. Efforts should be made to combat collapse and restore warmth to the skin by hot baths with mustard, and hot enemas of decinormal salt solution, which by being absorbed restore the fluidity of the blood and thus relieve the muscular cramps. Irrigation of the bowel with weak acid solutions is useful; a dram of tannic acid to the quart of water. Glonoin and strychnine may be given, and capsicin, and camphor, to combat depression and arouse the vital forces. Decinormal salt solution may be thrown under



the skin, or into the veins, with great advantage. If the patient can be kept alive a few hours he may recover; and restoration of the fluidity of the blood, and excretion of urine, are thus favored. The earlier experiments in this line failed because they were not repeated and persisted with.

In the stage of typhoid we have to deal with an enterocolitis. Morphine is here a dangerous and doubtful remedy. Irrigation of the colon with warm water is soothing and promotes elimination and healing. Salt solution is perhaps better than plain water. Hot applications to the abdomen are also useful. The diet should still be limited to stomach food. The heart may need sustaining, by hypodermics of strychnine and cocaine. Small doses of atropine may be needed to restrain gastric or intestinal irritation. But the whole treatment of this stage may be summed up in the word, Rest. With this, sustain the strength and enjoin patience. Massage will aid in removing from the muscles debris which may keep up cramps. Not until the intestinal epithelium has had time for regeneration should the patient be permitted to resume general food or to leave his bed. If convalescence is unduly protracted the fruit juices should be added to the diet, to prevent that scurried condition so familiar in the convalescents from typhoid under the old rigid diet.

C. D. Ussher, of Van, Turkey, says that cholera has lost its terrors for him since he began to treat it with colonic flushes of quinine solution, and atropine employed as above suggested. His opportunities for testing remedies for this malady are unusual.

In cholera morbus Burggraave cleared the bowels with saline laxatives, then under strychnine, morphine and hyoscyamine, the trouble soon subsided.

In true Asiatic cholera he urged the importance of prophylaxis by a hygienic mode of life; taking internally a granule of strychnine and three of quinine hydroferrocyanate every hour; daily cleansing by saline laxative, adding hyoscyamine for any tendency to colicodynia. In asphyxia every means must be employed to promote reaction, giving strychnine arsenate, one granule, and quinine arsenate, two granules, every ten minutes. When heat returns to the skin it should be encouraged by strychnine, aconitine and digitalin, two or three granules each, every ten minutes, to re-establish innervation, circulation and diuresis. Add tea, with rum. Continue till sweating occurs; then change the patient to another room and bed, with an open fire. Give a strengthening diet, soups and wine, in small and frequent doses; lessen the bedding as the sweating diminishes; and for at least two weeks continue the arsenates of strychnine and quinine.



## YELLOW FEVER

Yellow fever is a disease of tropical America and Africa. Its habitation is the West Indies and the coasts of the Gulf of Mexico and the Caribbean Sea. In Cuba, for four centuries the principal focus of the disease, it has been extinguished since the American occupation. Measures are being taken to accomplish the same task in Vera Cruz; and it is a reasonable expectation that this fever will be eradicated from the Western hemisphere within a few years. Its limits in Africa are yet to be established.

It has been a disease of the seacoast, rarely ascending beyond tide-water or above 1,000 feet above the sea-level; it has prevailed especially in cities where sanitary conditions favored epidemics; and its season has been, like typhoid, the close of the heated term. Frost puts an end to the epidemics, and to the patients.

Investigations made by Finley, Reed and others in Cuba, have satisfactorily proved that yellow fever is transmitted from man to man only through the medium of a mosquito, the *stegomyia*. Experiments carried out under the observation of physicians who doubted this, showed that persons just arriving from northern countries like Norway, and especially liable to this disease, sleeping in clothes taken from dead yellow fever patients and soiled with black vomit and dejecta, did not contract the infection if mosquitoes were excluded. Contagion has always been denied; the fomites theory has been finally disproved. If there is any other mode by which the infection can be transmitted it has yet to be shown; and every suggestion yet made in that direction has been disproved. For an epidemic to arise in any city now free from yellow fever it is necessary that a patient suffering with that disease shall be brought to it, that *stegomyia* shall have access to the patient and bite him, and after an interval of twelve days obtain access to and bite other non-immune persons. If the original patient imported is protected from mosquitoes there is no danger to nurses or to the town. Persons who stay at night within the protection of mosquito nets are safe even if the malady rages in their neighborhood.

This explains the accurate observations of the older physicians, who noted that those who lived on the heights around Rio de Janeiro were safe unless they ventured down into the city after night, when the *stegomyia* is most active; and that ships anchoring at least half a mile from the shore were safe—the mosquito does not travel so far in pursuit of her victims. Frost stops the epidemic and the mosquitoes at the same time. Both prevail in the autumn.

Yellow fever may be produced by inoculating persons, not immune, with the blood of infected patients. The incubation then extends over a period varying from forty-one hours to five days and seventeen hours. Guiteras thinks the disease is continued through light, unrecognized cases occurring in the children of the lower classes, the mixed breeds.

Immunity does not endure for life; though if the patient has once had the disease a second attack is exceedingly unlikely if he remains in the tropics. But if he removes to a non-tropical country and remains some years he loses his acclimatization, and is liable to another attack. This is an old observation, not yet tested under the mosquito infection theory. When we know more of the mosquito and of the life history of the germ that causes the fever we may be able to explain these things better.

But as yet the germ, which undoubtedly exists, has not been definitely recognized.

**Anatomy:**—There are no specific internal lesions that have been established. The skin is yellow; ecchymoses in the skin, free hemoglobin in the blood; heart sometimes fatty; stomach hyperemic, containing the black vomit, which consists mainly of blood pigment; swelling of glands, especially the cervical, axillary and mesenteric; liver pale or brownish yellow, its cells fatty; the kidneys show diffuse nephritis, the epithelium of the convoluted tubes is swollen and granular.

**Symptoms:**—The onset is sudden, occurring during the night. The patient does not report but is reported by his comrades, when on a vessel. He complains of chilly sensations, but especially of headache, with aching in the back and the legs; fever that soon runs up, the skin hot and dry, the tongue coated, sometimes sore throat. There is always anorexia, sometimes nausea, bowels constipated. The face is of a peculiar mahogany color, the eyes injected, the forehead burning hot. The eyelids and lips may be puffy. Careful inspection will often detect slight jaundice. The fever may reach 105° F. on the first day; and this is the danger point. In the writer's cases all died who exceeded this temperature, all others recovering. There is little variation, except in mild cases where the fever does not run as high, and relaxes toward the second evening. About the third day the fever falls, sometimes pretty rapidly, at others slowly, and for one, two or three days there is a period of calm. This may be a complete intermission, or in mild cases even the end of the attack. Usually, however, after this comes a reactive phase, in which the fever rises, the stomach is more intensely irritated than during the first period, and there may be complete failure of renal action. The skin may then become intensely yellow, and this may herald the onset of this stage. In bad cases there is little remission, the fever remains high through it, and the

stomach weak or nauseated. The older writers termed this a disease— with one paroxysm, the returning fever being, like the typhoid of cholera, a result of the attack rather than a stage of the malady.

The pulse is relatively low, about 100 on the first day, falling before the fever does, or even while it is still rising. During the remission it may fall to 30. This slow pulse with a rising temperature is significant of yellow fever.

Albuminuria is also significant, appearing by the third day and occurring in mild cases. In bad cases the urine may turn solid when boiled in the test tube. Tube casts are present in large numbers. The suppression of urine may be total. In one of the writer's cases there had been no secretion for two days, till a pint of champagne restored it.

The jaundice may not appear until after death.

The stomach is irritable from the first. The food is vomited, then mucus, known as "white vomit," and black vomit may not occur till the relapse, or on the second or third day of the attack. It consists of blood altered by the gastric juice. Ejected on a sheet it leaves a deposit like a filtrate, the colorless fluid sinking into the linen. Ecchymoses, petechiæ and mucous hemorrhages may signify the degree to which the blood has been disorganized. The older writers looked upon black vomit as necessarily fatal, being due to decomposition. While it is a bad omen it is not always fatal. The blood passes through the bowels also, appearing as tarry stools. Constipation is extreme, the stools being absent rather than retained, and not acholic.

There is sometimes active delirium, but usually the patient is quiet, not so much stupid as desirous of remaining quiet on account of the headache. Guiteras found his cases peculiarly alert, from the fear inspired by the disease. Suppression of urine causes hallucinations and may end in coma. These with aching of the bones prevent sleep.

During an epidemic cases of such mildness occur that they would not be recognized as such were it not for the prevalence. On the other hand malignant forms occur in which the patient may die in a few hours.

Convalescence may be marked by abscesses, parotid suppuration and diarrhea. In one of the writer's cases bulbar paralysis followed. In another hemiparesis followed, with a peculiar mobile state of the mental faculties, which gradually wore away, but were still evident ten years later. But in the vast majority there are no sequences; the disease runs its course to recovery or the grave in a week; and people in infected cities aver that they would "rather have yellow fever and recover than have a bad cold."

**Diagnosis:**—When the two coincide in prevalence it is impossible to diagnose between mild cases of yellow fever and bilious remittent.

In well-marked cases of yellow fever, the peculiar mahogany flush of the face, the slowing pulse with rising temperature, and the presence of albuminuria before the end of the third day, are in Guiteras' opinion sufficient to distinguish this from all other fevers. Add to this the irritability of the stomach and following black vomit, jaundice, and intense headache with clear intellect, and the picture is unique. There is not the intense bone-ache of dengue, and the mortality is enormously greater.

There is a form of malarial fever so similar to yellow fever that the former has received the title of malarial yellow fever. It is frequent in the Gulf coast cities, and under the name of Chagres fever has been and is destined to become still more notorious. Guiteras says jaundice occurs earlier in true yellow fever, but the older observers claimed it was exactly the opposite. The mahogany face of yellow fever is absent, also the albuminuria and excruciating headache. Hemorrhages and black vomit are rare, and the spleen is much enlarged in malarial forms, not in true yellow fever. Hematuria is common in malaria; there may be a history of that affection; and examination of the blood reveals the small ring-shaped organisms. The curative power of quinine is altogether wanting in yellow fever.

The mortality ranges from 15 to 85 per cent. It is worse in the case of persons coming from the north to the tropics, and the farther north their origin, the greater their danger. Users of alcohol are in greater danger of infection and if attacked are almost certain to die. Dissipation, preëxistent disease, all that lowers vitality, increase the gravity of the malady. A temperature ever so little above 105° F. was fatal in the writer's cases. The albuminuria is a fair indication of the gravity of the case; suppression of urine is most dangerous. Delirium and convulsions or coma depending on this cause are ominous, but sometimes they are due to fear, and less significant. Black vomit is, if not a fatal indication, very close to it. Continuance of high fever into the remittent stage is bad. The negro is less liable to the disease, and less likely to die of it; and this partial immunity extends to mixed breeds.

**Prophylaxis:**—Persons who must visit or remain in places where yellow fever is prevailing may escape it by observing a few simple rules:

Keep indoors at night, in apartments well-screened, and destroy the mosquitoes that may be inside; the infected *stegomyia* being more active at night.

**Treatment:**—Put the patient to bed, cover lightly with blankets, encourage sweating and keep the stomach absolutely empty. There is no possibility of food being digested while the stomach is so disorganized, and every attempt at feeding tends to induce vomiting and bring on black



vomit. Give enemas to wash out the colon, followed by small warm enemas of milk, soup or saline solution, to nourish the patient and flush the kidneys. Be it remembered that the attack lasts but a few days, and that the patient will not starve if he gets no food for this brief period, and if these facts are implanted in the understanding of the nurses the patient's life may be saved from the useless and perilous attempts that will otherwise be made to feed him. Sternberg advised corrosive sublimate in doses of half a milligram every hour, as an antiseptic, with soda as an antacid. The writer does not believe the antiseptic method specially indicated in this malady, or that autotoxemia plays that large part in yellow fever it does in fevers of longer duration. The center of the battle is in the kidneys, and on the maintenance of their function rests the life of the patient. Our experience has made us exceedingly nervous over anything that may induce vomiting. The best results have followed a regime calculated to secure absolute rest to the stomach. In one case that recovered nothing whatever, not even a drop of water, was permitted to enter the stomach until the symptoms showed that the danger was past, which necessitated such total abstinence for seventeen days. This was, however, a case of unique duration. Excellent results have been reported from the hypodermic injection of pilocarpine, gr. 1-6, repeated if free sweating is not induced. This is in line with the older observations as to the value of sweating. Since a temperature of 105° F. seems to be the dead line, it would seem that there is an admirable field for the applications of hydrotherapy. But in all the trials made under the writer's observation it has failed. Others have reported more encouraging results, and it seems worthy of further trials. The patient does not die of hyperpyrexia, however, and the fact that when a killing frost puts an end to the epidemic the patients then affected die, is significant.

The irritability of the stomach may be quieted by hypodermics of cocaine or of morphine, gr. 1-8 of either, over the epigastrium, or by mustard over the pneumogastric nerve in the neck. Ice applied here is also effective. Pretty free hemorrhage is probably useful, but if it is deemed wise to interfere with it, the remedy is a hypodermic of atropine gr. 1-134 or more. Strychnine hypodermics may be employed to sustain the vitality, or veratrine to relax vascular tension when excessive—dose gr. 3-134 to double this at once, repeated if necessary. While no other form of elimination can replace entirely that of the kidneys, it must not be forgotten that pilocarpine increases the cutaneous elimination of solids five times, or to half that excreted by an equal quantity of urine. Small exosmotic enemas of saturated salt solution, cold, also aid in removing a part of the toxins, and by these means we may reduce the poisons.

to what the natural powers of the patient may enable him to withstand. This we believe to be the keynote of the treatment.

During the epidemic of 1905 we sent a number of southern friends a supply of calx sulphurata, with the suggestion that saturation with it might prove protective against the attacks of mosquitoes and other insects. Every report we received has confirmed the suggestion, and we recommend the method for general trial. At the time of writing trials are being given on the Isthmus of Panama.

Burggraave quotes Vera's treatment approvingly. During the first period the diet is limited to acidulated drinks; blood-letting may be requisite; give emetine, clearing the bowels with sweet almond oil with lemon juice; tepid baths and cold compresses to the forehead, vinegar to the back and limbs; emollient enemas; alcohol has not given good results. In the second period he gives acid drinks, ice, water ices, beef or veal soup. In the third period he employs tonics and antispasmodics—*verbenas* has been lauded, possibly a parasiticide. But this does not touch the true nature of the disease. Burggraave advises beginning with saline, following with strychnine, hyoscyamine and morphine, to calm lumbos-  
abdominal pains and vomiting; fomentations to the head for excessive heat; then the defervescent, two or three granules each of aconitine and digitalin, every hour till resolution and diuresis occur; in the third period giving quinine hydroferrocyanate to prevent new accesses. As soon as possible get to a reconstituent regimen, with quassin and soda arsenate.

### CEREBROSPINAL FEVER

This fever occurs sporadically and in localized epidemics; in the country more than in the city; more frequently in winter and spring. The collection of young recruits into camps seems to afford a specially suitable opportunity to this disease. Fatigue, mental depression and crowding, with other elements of bad hygiene, are the predisposing causes. While not apparently contagious, or transmitted by excreta or clothing, it depends on the *diplococcus intracellularis* as its prime factor. It is not self-protective. It lingers indefinitely in a place once attacked, but its transmission is governed by conditions not yet recognized.

The *diplococcus* is termed *intracellularis* because it is found almost always within the polynuclear leucocytes. Malignant cases show intense congestion of the cerebral and spinal meninges, and a fibrinopurulent exudate, all most marked at the base of the brain, but extending over the cortex. The affection is most severe along the posterior surface of the cord and extends to its end. In less acute cases the meninges are hyper-



plastic and the exudation is shown by yellow patches. The dilatation may be great. The brain may be softened, pinkish, with points of hemorrhage and of inflammation. The second, fifth, seventh and eighth cranial pairs are most affected. The exudation is made up of a fibrinous matrix containing many polynuclear leucocytes. The affected nervous tissue is infiltrated with pus, the neuroglia swollen, with large, clear, vesicular nuclei. The diplococci are most numerous in the brain. They have been found in the nasal mucus and the lungs, where they cause a form of pneumonia. Ordinary pneumonia, pleurisy, nephritis and enlargement of the spleen have been associated with this malady occasionally.

The malignant type may occur in epidemics or sporadically. It has a sudden onset with chills, headache, hebetude, muscular spasms, profound debility, medium fever, and a pulse feeble and slow, perhaps only fifty beats per minute. Petechiæ appear. Death is apt to ensue before the close of the day.

In the commoner form, after an incubation of unknown duration the attack sets in with similar abruptness; headache, backache, anorexia, heavy chills and vomiting, fever touching 102° F., pulse full and strong, painful stiffness of the back of the neck. The aching increases, with photophobia and intolerance of noise. Children are restless. The head is drawn back, the back may be arched, and the pains extend to the legs. Tremors are present, and convulsions of the muscles of the extremities, tonic and clonic. The back and neck become rigid. Strabismus is common. The facial muscles twitch. The muscles of the eyes or face may be paralyzed.

Headache is the chief complaint. The spine is sensitive to pressure and the skin may be hyperæsthetic. Delirium may be an early symptom, violent or erotic, but as effusion comes on it gives way to coma. There is no uniform course to the fever, which is not very high, as a rule, but may be hyperpyretic. The pulse is also variable but apt to be remarkably low. Cheyne-Stokes respiration has been observed. Much importance is assigned to the skin affections. Herpes is frequent. The petechiæ that give a name to the disease are commonly but not invariably present. Erythema, dusky mottling, rose spots, urticaria, ecthyma, pemphigus and even cutaneous gangrene have been observed.

Leucocytosis is early and constant, up to 40,000 per cubic millimeter. Osler found the diplococcus in the blood during life. Vomiting may continue through the course, diarrhea is less frequent, constipation being usual. The urine may be albuminous, increased in quantity, glycosuric or hematuric.

The course of this fever presents many variations. Death may ensue in a few hours, at least half the fatalities coming within five days, or the malady may be protracted for months. If the patient survives the fifth day with improvement in symptoms, falling fever, fewer or lighter spasms and returning intelligence, the prognosis is good unless a relapse occurs. A sudden fall of the fever is bad. Convalescence is slow and apt to be interrupted by sequels. After bad cases recovery may be incomplete, and epilepsy may remain, or idiocy, for life.

Sometimes the onset is violent, but in a day or so the symptoms subside and the attack is aborted.

Walking cases also occur, with the usual symptoms in mild form, little fever or vomiting; only recognizable from the prevalence of an epidemic. Other cases closely follow the fever curves of malarial fevers, or pyemia, with great hourly perturbations. Chronic forms are frequent (Heubner), and may last for months, with recurring fever, varying symptoms and great wasting.

Among the more frequent complications are pleurisy, pericarditis and parotitis; sometimes pneumonia, multiple arthritis, serous or purulent; enteritis is rare. Headache, or a disposition to it on the slightest provocation, may remain indefinitely after recovery. Hydrocephalus may follow in children. Aphasia also may ensue. It is the writer's impression that complete recovery from a severe attack is almost unknown. Partial recovery in one case was followed by a year of invalidism, and death at the end. Affections of the eye, ear and nose are due to implication of their nerve roots in the disease.

Diagnostic signs are the headache, delirium, retraction of the head and bowed back, tremors and rigidity of the affected muscles. The slow pulse and moderate fever are less significant. Kernig's sign: If the thigh is flexed on the abdomen, the leg can not be extended on account of strong flexor contractures. This is probably always demonstrable in meningitis. But the most trustworthy evidence is afforded by lumbar puncture. A little chloroform may be given to a child. The patient lies on the right with knees drawn up and the left shoulder forward; the lumbar spinous processes are fixed, and the needle of a small aspirator is thrust into the third inter-space at one side of the median line, directed upward and inward, penetrating about  $2\frac{1}{2}$  centimeters in infants, 4 to 6 in adults. Fluid exudes by drops, turbid, purulent or bloody in meningitis, though it may be clear. The microscope determines the organisms present. Tuberculosis may be detected by inoculating a guinea-pig. It is claimed that the exudate in tubercular cases contains only lymphocytes, while in pneumococcus and intracellularis cases the polynuclear leucocytes pre-

dominate. (Cytodiagnosis.) If iodides are given, iodine may be detected in the former but not in cerebrospinal fever. Osler doubts both these assertions.

The mortality varies from 20 to 75 per cent, being greater in children. High fever, coma and severe convulsions are ominous. Recovery is more likely if the patient survives the fifth day; but in very tedious cases there is probably a permanent lesion of the cerebrum.

But little of the old treatment of this fever deserves mention—"futile," as Osler well expresses it. He mentions local blood-letting as sometimes useful; and cold to the head and spine approvingly. In one case, due, however, to the pneumococcus, cold was applied continuously for weeks; the patient was saved by it, but after a year of suffering finally died. If used at all it should be applied very cold, with due intervals to prevent harm from the action of the cold on the tissues. A case was reported in which great relief was experienced from the application of hot water on cloths, so hot as to scald the nurse's hands, and continued till the malady had subsided. This case was not verified by modern scientific methods, and must be taken with that grain of salt. Unless the temperature is higher than usual it is difficult to see what benefit is to be expected from hydrotherapy, which is recommended automatically. Counter-irritation is not equal to applications of heat and cold, and should be reserved for the stage of convalescence when there may be effused material to be absorbed. Then four lines may be drawn along the spine with a crayon of silver nitrate (the skin previously wet), half an inch apart. This is the most effective and least painful method. Some benefit seems to follow lumbar punctures. Everyone recommends opiates, morphine hypodermically; and if we can not cure we might as well give what relief we can. There is no evidence that the huge doses of iodides, bromides, quinine, ergot and chloral so freely used of late possess any beneficial properties whatever. There is more reason in the maximal use of mercury, yet it has no clear evidence in its favor.

The resources of active principle therapy have not yet been drawn upon in treating cerebrospinal fever. But it can do no harm to empty the bowels with calomel followed by saline laxatives, and disinfect the stools by giving zinc sulphocarbolate, gr. 2 1-2 to 5 every two hours. Sthenic fever is controllable by the defervescent triad, every quarter to one hour as required; for asthenia substituting the dosimetric triad in similar doses. It is worth while to try if an attack may not be broken at the outset by a full dose of pilocarpine, gr. 1-6, hypodermically, repeated hourly till free sweating or salivation results. The effects of nuclein in full doses, and of saturation with calcium sulphide in other maladies have been so



good that they deserve a trial here. The acknowledged failure of former methods imperatively demands striking out in new directions, instead of turning over the same old muck-heaps uselessly. Solanine may prove a valuable sedative here; pushed to full effect.

During convalescence there is need of the tonic roborant regimen, with absorbents continued many months. The iodides of mercury, iron, arsenic and gold, may be alternated or combined, according to the indication. Iodoform may be a useful addition, when there is cough, or abdominal pain.

Other remedies may be indicated by special symptoms.

Gelsemium has long enjoyed considerable popularity in some sections as a remedy for all forms of meningeal inflammation. The uncertainty of the ordinary forms in which it was presented has deterred many from giving this agent a fair trial. The alkaloid gelseminine is now accessible in a state of purity and uniform strength, and may be utilized. As compared with veratrine and aconitine, gelseminine presents a maximum of cerebral sedation with a minimum of circulation depression. This would render it especially suitable for a malady where there may be but little fever and a slow pulse with a fatal encephalic inflammation. The adult dose of gelseminine is 1-250 grain, and as this alkaloid is very quickly absorbed and eliminated, the dose should be repeated every fifteen to sixty minutes, according to the acuteness of the symptoms, until the cerebral irritation shall have subsided or the characteristic drooping of the eyelids shows that the full therapeutic effect has been obtained. Beyond this point there is no benefit to be had, and the remedy should be discontinued or given less frequently.

Another agent that deserves retrial is conium. No drug of the older pharmacopœia is more notoriously untrustworthy than this. Freshly prepared succus conii may afford some useful effects; but though the plant possesses undoubtedly valuable properties it has fallen into almost complete disuse on account of the variability of even those preparations that sometimes manifest activity. We have now, however, in the hydrobromide of the alkaloid cicutine, an agent possessing all the therapeutic values of the plant, uniform in strength and retaining its powers unaltered when made into granules. As a sedative in nervous unrest and cerebrospinal irritations and inflammations, cicutine hydrobromide grows in favor most rapidly with those who make the most general use of it. The adult dose is 1-67 grain, and this should be repeated every quarter-hour, half-hour, or one, two, or three hours, according to the conditions present and the effects. Muscular weakness and vertigo indicate the beginning of toxic action, beyond which this remedy should never be pushed. Usually the

desired relief occurs before such toxic effects appear. As cicutine raises vascular tension and the body temperature, it is obviously not suitable for cases showing fever and evidences of sthenic inflammation.

Cicutine and gelseminine are synergistic and may be administered together when both are indicated. They are suited to the asthenic forms, with low fever and slow or weak pulse. If the fever is asthenic or the eliminants sluggish, veratrine will be a better selection; while for doubtful, median forms aconitine offers a nicely appropriate remedy. Photophobia is an indication for cicutine which notably relieves this symptom.

The indications clearly dominating the treatment of this terrible malady may be stated as:—

The alimentary canal to be thoroughly cleared and rendered as nearly aseptic as possible—calomel, saline laxatives, zinc sulphocarbolate, each in appropriate dosage.

The utmost sedation compatible with the patient's condition—gelseminine and cicutine hydrobromide for asthenic, aconitine or veratrine for sthenic forms; either pushed to full effect.

Possibly breaking up the attack at the outset by full dosage with pilocarpine, or stopping the microbial action by saturation with calcium sulphide, as early as possible—it is one thing to stop the damage; another to repair it.

The patient's strength to be sustained from the first, not by a senseless pouring in of food he is unable to digest and assimilate, but by the most judicious and scientific feeding, massage, bathing, fresh air, and especially by the use of nuclein in full doses to reinforce the leucocytes and invigorate them in their life and death struggle with the microbes.

The moment the acute malady has subsided the absorbents should be put to work to remove the *debris* before it has become organized or done more damage than compress the nerve structures. The writer presents the following as the most speedy and powerful absorbent combination he has as yet made trial of—one far superior to the ancient “corrosive sublimate and iodide:” Mercury biniodide, 1-67 grain; iodoform,  $\frac{1}{8}$  grain; phytolaccin,  $\frac{1}{8}$  grain, of each three granules; arsenic iodide 1-67 grain, one granule; these ten to be taken together four times a day, one daily dose being added every two or three days until evidences of iodism or conjunctival irritation, or perhaps of mercurialism, though this we have never yet seen, show that the toxic point has been touched, when the doses must be slightly decreased and the remedies held as closely as possible to this point for weeks or months.

The treatment herein recommended is founded on the pathology of the disease and the known action of the remedies suggested. The old



treatment had only an empiric foundation, and has failed completely. Not a single remedy as yet proposed has approved its value in practice. Serums offer little chance of success in dealing with a malady that may be caused by any one of a number of different microorganisms.

## INFLUENZA

The pandemic prevalences of this malady are for years followed by endemic outbreaks in various localities over which it has passed. It is noted for its protean manifestations. It lasts in any one place about two months, during which few escape. While it kills few directly, during its prevalence many die of other affections so that the death-rate is very high. Many chronic invalids die when this is added to their maladies.

The cause of influenza is now acknowledged to be the bacillus discovered by Pfeiffer. This is not the cause of the ordinary colds often mistaken for influenza. True influenza is very contagious, spreads as fast as man can travel, occurs at all seasons and is not self-protective. Few are immune.

Pfeiffer's bacillus is a small, non-motile organism, staining well in Loeffler's methylene blue and in a dilute pale-red watery solution of carbolfuchsin, grows only with hemoglobin, and is present in enormous numbers in the nasal and bronchial secretions of those affected. How long it persists after the attack has subsided is not known, but it may be found for years. Malaria is less prevalent during influenza epidemics. Osler does not believe that animals are attacked epidemically at the same time as men.

The incubation lasts one to four days. The attack is abrupt, with fever and the other symptoms. In the respiratory type the bacilli invade the whole of that mucous tract. The attack resembles an acute coryza, with unusual debility—a worse cold than usual. Bronchitis develops with fever, delirium and prostration approaching the typhoid type. Pleurisy or pneumonia may ensue. The sputa may be profuse and serious, greenish yellow and nummular, or dark red and bloody. Diffuse bronchiectasis may result. The malady may extend to the finer bronchioles and present capillary bronchitis with cyanosis and dyspnea. The pneumonia may be purely influenzal or mixed with pneumococcus. The former is usually catarrhal. The course is irregular, the disease often masked. Pleurisy is less frequent and apt to end in empyema. Preëxisting tuberculosis is aggravated.

In the nervous form we have suddenly presenting headache, pains in the back, legs, or any part, intense in character, with profound prostration. Acute inflammations of the nervous substance may cause paralyses, or



any form of neurosis may be presented. The heart is often disordered. Mental aberrations may follow.

Sometimes the force of the malady is expended on the stomach and bowels, with the same violent and sudden outbreak, intensity of pain and other symptoms, and great prostration. Jaundice, enlargement of the spleen and collapse are noted sometimes.

There is a febrile form lasting weeks, remittent, irregular in type, with chills simulating malaria, or continuous like typhoid.

Many other forms might be described, as the force of the disease exerted on the kidneys, bladder, brain, testes, heart, uterus and ovaries, eyes, ears or other organs. Herpes, erythema, purpura and other skin affections are seen. Vertigo may be a sequel. Many persons date the invalidism from influenza, which has left behind it a train of ailments with debility that is with difficulty relieved. Sometimes influenza seems to simulate another disease that is prevalent.

The diagnosis is easy, if everything occurring during an epidemic is ascribed to influenza. And in truth, everything seems to be tinged or influenced by it. The suddenness and violence of the attack, the suffering out of proportion to the apparent malady, and above all the loss of tone and profound vital depression, indicate this affection. Discovery of the specific bacillus confirms a diagnosis already made.

Isolation is impossible and useless in an epidemic. Disinfection of the excreta is unavailing in a malady whose germs can be found in the sputa for years after the attack. There have been given tons of quinine, other tons of ammonias, other tons of coal-tars, and when a serum comes along tons of it will be given, with as high hopes and as great initial enthusiasm. But up to the present no remedy has proved of actual, unmistakable value in checking the disease, shortening the attack, or influencing its termination. Possibly Raspail's camphor was better than any later fad.

**Treatment:**—We must go on general principles, applying the treatment that has given the best results in fevers of other forms. While strychnine is exceedingly useful, the tendency to push it too strongly must be avoided. It seems natural that in a disease whose principal manifestation is weakening of general tonicity, universal relaxation, this greatest of function incitors and tissue stiffeners should be indicated in quantities to meet the need. But there is also in influenza a deficiency in irritability, and very soon we see exhaustion, which is quickly followed by toxic symptoms from even moderate doses of strychnine. The writer has been compelled to lay aside this powerful weapon and substitute the weaker brucine, in doses of gr. 1-67 every one or two hours, in some cases.

The same may be said of other drugs; be careful in giving large doses, for toxic effects may be caused by moderate doses of any of them. Nowhere is the importance of the delicately accurate system of minimal cumulative dosage instituted by Burggraave better demonstrated than here.

Leave out the coal tars. The alkaloidal combinations will go far in subduing fever and assuaging suffering. Beyond this rely as much as possible on heat. The hot bath and hot water-bag, skilfully applied, will be of immense benefit. All anodynes are objectionable. Opiates are sometimes deadly; alcohol has been fully tried and found absolutely useless and dangerous, increasing vascular and nervous relaxation and further depressing the vital forces. All the benefit obtainable from it is better secured from hot capiscum tea, with a few drops of tincture of camphor. Of course men would prefer punch, but we are talking of medicine, not catering to depravity.

Various combinations of ammonia salts have been used as means of relieving suffering; and some benefit may be allowed them. There is no specific virtue in any of them; they do not act as antacids for there is no acidity to counteract. The benefit is due to momentary stimulation, and this is soon past, and their continued use is a disadvantage and a cause of debility—quickly induced in influenza. We may find better remedies among the so-called antispasmodics, to which group ammonia belongs. Camphor has been mentioned, and musk, castor, valerian, asafetida and sumbul each possesses some power of relieving suffering and sustaining the vital forces in this malady. For convenience the writer prefers the valerianates, and gives caffeine valerianate in doses of gr.  $\frac{1}{4}$  frequently repeated. Small doses—but we are dealing with a disease in which the dosage can not be too delicately adjusted. Atropine valerianate, gr. 1-250, is more powerfully anodyne and is sometimes useful, especially when there is free sweating or special respiratory debility. Strychnine valerianate is also useful, and would be substituted for the arsenate but for a lingering hope that arsenic may possibly exert a germicidal action upon the bacilli.

For joint pains, give quinine salicylate gr.  $\frac{1}{4}$  every half hour. Again small doses! But eight grains a day is not homeopathic in minuteness, and some of us need an object-lesson on the principle of the constant infiltration of a remedy into the blood by this cumulative dose system. It acts like the oil that quiets waves, by preventing the beginning of wave formation.

Rest in bed as long as the depression lasts; rich, highly nutritious foods, easily digested, turtle soup, clam broth, raw oysters, and eggs, warm milk, predigested foods, fresh fruit juices, coffee, best in small quantities frequently repeated every two hours, and pushed to the limit of the digestive capacity.



Gentle massage, rubbing warm cod-liver oil or goose-grease into the skin. Hot salt baths and rubbings. Change of air to seaside or mountain, with simple bitters and iron during convalescence. From its properties as a contractor of connective tissue, berberine may be preferable to other bitters; gr.  $\frac{1}{2}$  every two hours during the waking hours.

Thus far we are carried by experience. We still await the specific for influenza, the germicide that will pursue the bacillus into the blood channels and conquer it there. Possibly nuclein may be of benefit; and it should be given in full doses, as one remedy that will not exhaust susceptibility.

Persons suffering with influenza or convalescing from it, are peculiarly liable to autotoxemia, and depressed by it in their mental faculties as well as their physical functions. Many a suicide might have been prevented by salines and antiseptics.

Laura says the principle indication is to combat the infectious element, and at the same time to relieve and sustain the general forces of the poisoned organism; in particular to correct and reestablish cardiac strength. For even in pulmonary localizations of the infectious maladies, one dies of cardiac rather than of pulmonary paralysis. The remedies that sustain the nervous forces and cardiac energies are also those capable of sustaining the life of the lung and restoring it to a normal state.

Pleuropneumonia is the gravest complication of infectious maladies, especially of *la grippe*, which, by its toxins, gives to the ailment its asthenic and adynamic inpress, and by its multiple localizations augments the dangers and necessitates a therapeutics energetic and complex. Against the toxins the best remedy is calcium sulphide, especially in respiratory forms where it also combats the association of other pathogenic microbes and catarrhs, especially fetid forms. With this may be associated the benzoates, salicylic acid and iodoform. High temperatures are met with aconitine. Quinine arsenate and hydroferrocyanate are useful for remittent and intermittent fever. In all asthenic and adynamic forms of fever quinine is a truly precious tonic and cardiac. The physician finds in digitalin and strophanthin two powerful cardiocynetics, and their association is completed by adding strychnine, which in all morbid asthenic and adynamic forms should never be forgotten; for it constitutes the most prompt and powerful general therapeutic dynamogene of the nervous energies. When it is necessary to arouse suddenly and urgently the nervous forces of the heart, we must have recourse promptly to caffeine, a rapid excitator of the heart and advantageous also through its prompt diuretic effect. When the urine grows scanty, anuria should be carefully combated to prevent insufficiency of elimination and depuration of the blood. Follow caffeine with other

cardiants, as its action is transitory and passing, though useful from the particularity of its clinical application. The doses should be proportioned to the case; the granules employed, or hypodermic injections in urgent cases. Tolerance is proportionate to the degree of asthenia and adynamia present. In the frequent hemorrhagic forms of *la grippe* ergotin is indicated in sufficient doses, frequently repeated. Cleansing of the stomach and bowels, especially in gastrointestinal catarrh is secured with benefit by using saline laxative by mouth or rectum. In hyperpyrexia add applications of cold water. To the drug therapy it is absolutely necessary to add a wise hygienic therapy. All cases of this malady require absolute rest in bed, even the mildest, to avoid the supervention of grave symptoms or perilous localizations. The diet should be liquid, but restorative and tonic—milk, bouillon, cocoa, eggs, old wine, tonic beverages. The air of the sick-room should be changed incessantly; nothing being more dangerous than the air of a room charged with exhalations from an infected body. The doctor must combat vulgar prejudices against drafts, which leave the sick man enveloped in a *pestic* milieu, no less hurtful than the disease and often much more dangerous. The sick-room should be the largest of the dwelling, the bedding frequently changed unless weakness of the patient forbids. During convalescence the arsenics, irons, glycerophosphates, animal diet, the country. Scrupulously following the methods indicated, life is saved and convalescence abridged—often dragging along after the physician has left the patient to himself. The physician if he does not pose as *dominus*, must never forget that at least he is the *minister*. Therapeutic nihilism in grave maladies is a crime.

Monin says that when the microbial virulence is very marked, or when the nervous prostration (from the overpowering force of the attack, or from preëxistent infections, or organic lesions) enfeebles the individual resistance, we then see installed the malignant forms of influenza, the powerful microbial associations, infections superadded or aggravated by the biosthenic bankruptcy. It is then that one observes rachialgia, delirium, typhoid symptoms, profound or extensive pulmonary congestions, pleuropneumonias, tachycardia, myocarditis, etc. *La Grippe* possesses the singular property of arousing previous conditions that appeared to be cured; not tuberculosis, which often merely sleeps, but angiocholites, arthrites, cerebral affections, metrites and urethrites. His treatment begins by confining the patient to bed, or at least to his room; clearing the alimentary tract by a saline; light liquid diet, hot soups, weak grog, fluids pushed to toxin-elimination. For thoracic congestion or tendency to hemoptysis he applies dry cups to the chest and sinapisms to the thighs. The primary therapeutic indications are the fight against



the infection of the blood, and the depression, often remarkable, of the nervous system. For this he advises the 'antizymotic' granule, which contains brucine, gr. 1-134, quinine hydroferrocyanate, gr. 1-12, calcium sulphide, gr. 1-6, and aconitine cryst., gr. 1-500. This sufficiently pushed as to dosage will meet the gravest symptoms; even neutralizing the toxic effects of the grippal poison on the great sympathetic and the pneumogastric, and extricating many times the influenzal from collapse, cardiac arrhythmia, bradycardia, agrypnia resisting all calmants, etc. In ordinary cases it suffices to give one of these granules every hour during the first days, and in grave and alarming forms one every half-hour for four hours, and then every hour. These granules possess a manifest antipyretic and neurosthenic activity, and stimulate to the highest point microbial elimination. Their puissance bursts forth especially in the face of nervous manifestations so characteristic of influenza, suppressing orbital headache, nocturnal agitation, polymorphic neuralgias, and promptly remedying that invincible lassitude, that strange enervation of the forces, to make place for the most salutary general reaction. When the thoracic manifestations persist nothing goes so well as calcium sulphide, for the painful erythematous angina, and the persistent paroxysmal cough and retrosternal dyspnea due to laryngotracheal *grippe*. The disengaged sulphydric acid acts also against the bronchial infection, and may jugulate grippal pneumonia and pleurisy; the neutralizing effect of this antiseptic gas being exerted on the pneumococcus and streptococcus in the pulmonary alveoli, where the gases of the blood are interchanged. This treatment causes the grippal state to quickly pass on to convalescence, usually marked by profuse sweats, notable polyuria or herpetic eruptions. If the patient is kept under the mild influence of the sulphide and the antizymotics, *la grippe* will not be "that malady of relapses, recrudescences and surprises," the cause of so many mischances. For by this we do not permit the bacterial toxins to perpetrate on our most noble cellular elements their anatomic or functional lesions; we abridge that valetudinarian state that by prostration and cerebromedullary languishing comes so voluntarily into grippal neurosthenia. It is by active opening of emunctories as well as by reabsorption and elimination of necrosed elements that the dosimetric treatment installs convalescence as frankly particularly so noted by all observers. While some retrograde spirits continue to look on the war for organic defense as a chemical equation and persist in their disastrous practice of seeking to destroy directly the pathogenic agent, dosimetry has known how to elevate the problem and proclaim the necessity of exalting the vital resistance, which alone is capable of rendering the microbe inactive, by supplying him an environ-



ment improper for his proliferating prosperity. By putting in play our natural forces of elimination and destruction, in exalting phagocytosis or positive chemotaxis, the granules take with our cellules an active part in the antitoxic warfare; they excite the leucocytes against their invaders, until victory is incontestable. There then remains (through the banalities of hygiene and the tonic regime) only to repair the breaches which during the assault have been produced in the organic fortress.

## DENGUE

Dengue is a disease of the tropics, spreading to semi-tropical countries in epidemics. It is as pandemic as influenza, few of an infected community escaping. It is most frequent in the West Indies. Epidemics travel along the routes of trade and by ships. Arriving at a city, nearly every person is attacked, and in two months the epidemic has run its course. If dengue spreads beyond its usual limits it is in the hottest part of the year, and the epidemic is stopped by frost. Dryness of season has no influence. It clings to the coast but will invade the interior and ascend the highlands on occasion.

The attack may be heralded by some hours' malaise, headache or rheumatic pains; or it may begin abruptly. Pains and fever set in with the greatest severity, or chilliness occurs, or deep flushing of the face. Fever rises rapidly, the head and eyes ache; and some parts of the body, muscles, bones or joints, ache with such severity that the name of "break-bone fever" is well earned. The loins ache, the face about the eyes grows purplish, the skin and mucosa are flushed and erythematous. Within a few hours the patient is helpless, pulse 130, temperature 103° to 105° F. or more, with intense headache, unable to move for pain, and prostrated. The skin is hot and dry, the tongue coated, the stomach oppressed or sick.

The fever touches its highest point the first day, and on any day subsequently the symptoms may begin to subside. Or, on the second day crisis may set in with profuse sweating, diuresis, diarrhea or epistaxis. Relief is immediate. The erythema also disappears. Whether the fall is by crisis or lysis great comfort ensues, and there is an intermission in which the fever is gone and the patient may be up and about. This may be permanent, but on any day from the fourth to the seventh from the first attack a relapse may occur, with more or less of the symptoms of the first paroxysm. It is usually lighter, however, but with it is seen a roseolar eruption which may persist for several days after the fever has subsided. Desquamation follows, similar to that of measles. As the relapse breaks up the temperature may become subnormal.

The eruption may be absent. It begins on the hands and extends up toward the elbows, with prickling and tingling, then appears on the back, chest, upper arms and thighs, as discrete red-brown spots, round, slightly elevated, up to one-half inch in diameter. By enlarging they coalesce into irregular patches. The whole skin may be covered. The hands, wrists, elbows and knees are most affected. It disappears on pressure. It fades as it appeared. Desquamation may continue for weeks, with intense itching.

Convalescence sets in at once and in a few days the patient is back at his business, but the pains may continue for a longer time, or recur suddenly in some joint or muscle. The knee is most frequently affected, then the wrists and shoulders. The soles of the feet and the tarsus are often affected. The malady may persist until the muscles atrophy from disuse. The pains may be difficult to locate, the muscles and joints being movable and handled without suffering. They are worse on rising or on moving after rest. Rest and heat relieve. Passive motions are painless but resistance to motion causes acute pain. A sense of powerlessness accompanies the muscular pain.

During convalescence the patient may also suffer from anorexia, debility, insomnia, febriculæ, pruritus, urticaria, lichen, papules, adenitis, orchitis, cardiac inflammations, purpura, hyperpyrexia, mucous and uterine hemorrhages, or albuminuria. Pregnant women do not as a rule abort.

There seems to be much variability in the types of different epidemics. Some describe swelling of the joints, metastases, melancholia, etc. But the essentials are present, in a sudden rise of temperature, initial erythema, pains in limbs and joints, and a rosy eruption in the relapse.

Immunity does not exceed a year.

The incubation is from a few hours to three days, rarely more.

Death rarely occurs, except to young and feeble infants or aged and infirm victims of chronic ailments who were struggling on the verge of the grave before this affected them. Delirium and convulsions are bad omens in infants. Hyperpyrexia with pulmonary edema followed by coma sometimes occur. The malady lowers the vital forces, however, and many fall victims to other maladies which they might otherwise have withstood.

Few autopsies have been reported. The only morbid anatomy mentioned was inflammation of the lungs and meningitis.

Dengue may be confounded with scarlatina, measles, roetheln, syphilitic roseola, influenza, rheumatism or malaria. The existence of the epidemic, the rash and peculiar pains will usually suffice for diagnosis.



For the pains give quinine salicylate, gr. 1-6 every half-hour, and caffeine valerianate in similar doses. Atropine valerianate, gr. 1-250 may be added until the mouth begins to feel dry. Hot packs, salt baths and rubbing, and hot water-bottles, will aid in giving relief without opiates, which are to be avoided if possible as their ulterior effect is injurious. In no infectious fever can it fail to be harmful to lock up the excretions within the sick man's body.

During convalescence the arsenates of iron, quinine and strychnine, with quassin or berberine, and the resources of the reconstructive regime, are indicated.

No specific treatment of dengue has yet been discovered.

## THE PLAGUE

A specific, inoculable and otherwise communicable epidemic disease, common to man and many of the lower animals; characterized by fever, buboes, rapid course, high mortality and a specific bacterium in the lymphatic glands, viscera and blood (Manson).

The reader will do well to secure a copy of Defoe's "History of the Great Plague in London." He will find it the finest account of any plague extant, of absorbing interest. Though not written by a physician and not historical, the account given is substantially correct.

While the development of American interests in the East and the opening of the Panama canal may be expected to render the plague of more direct interest to us in the near future, the gradual retreat of the malady and the circumscribing of its epidemics by the application of practical hygiene are rendering this affection rarer and its extinction is within reach.

The specific cause is a coccobacillus, discovered by Kitasato. It is found in the buboes at first alone, but later with pyogenic organisms. It also appears in most of the organs, the blood, and in the pneumonic form swarms in the sputa. It resembles the germ of chicken cholera, being short and thick, with rounded ends, is actively motile with a terminal flagellum (Gordon). It is readily stained by aniline, the ends more than the middle. It does not form spores (Kitasato).

The best temperature for culture is between 36 and 39° C. Plague is almost certainly inoculable in man, as it is in the lower animals. Rodents are always killed by the inoculated disease, birds survive, monkeys are readily affected, sheep and swine slightly if at all (Lowson). Dogs are readily infected. Late in the attack the pus is so much reduced in virulence that it has been conjectured that pyogenic organisms destroy the pest bacilli.

The observations made in New Zealand strongly favor the view that the plague is not directly contagious, but that the bacilli are transferred to animals like the rat, by insects; and that if the access of fleas, and probably flies, is prevented there will be no spread of the malady. The extermination of the rat is now looked upon as the most important of prophylactic measures. While bad air and overcrowding have their influence as in most epidemic maladies, it is by lowering the vitality, and affording opportunities for insect transference, rather than by direct contagion. There is less evidence in favor of the older ideas as to transmission of infection through air and the survival of bacilli in soil. When a disease is acknowledged to affect rats, mice, dogs, flies and fleas, and may affect bedbugs and other insects, it is difficult to exclude such methods of direct transference; and we believe there is no known case of contagion where such transference has been absolutely prevented. Even in Bombay physicians and nurses have been rarely attacked.

The virulence of the bacilli may be increased or mitigated. Defoe noted that the earlier cases were uniformly fatal while those occurring toward the close of the epidemic were much less dangerous. Virus passed through a succession of guinea-pigs becomes more rapid in its action. Yersin found that when cultivated on gelatin-peptone some colonies developed quicker than others, and that if inoculations were made from the colonies first developed the virulence was less than from the others, so that in time they ceased to be fatal to guinea-pigs.

Rodents fed on plague-infected material die of that disease.

Mice inoculated with plague were placed with others not inoculated; the first died soon and the others later; proving transfer of the malady by contact—or by parasites.

It is difficult or impossible for plague to spread in districts subject to good sanitation; while in the domains of filth and overcrowding it spreads like wildfire (Manson).

Open wounds are apt to become infected. Post mortems are safe if no wounds are made. Infected food and drink will convey the disease. Many infections occur through small wounds of the feet coming in contact with infected earth—or with fleas that have left the bodies of dead rats.

*Symptoms:*—The incubation varies between two and eight days; very rarely extending to fifteen. During the period of greatest malignancy it has been claimed that this period may be shortened to three or four hours.

In a few cases prodromes have been recorded, malaise, melancholy, anorexia, chilliness, giddiness, palpitations and dull pains where buboes are developing. Griesinger mentioned also lumbar pains.



The attack is more often abrupt, with depression extending to collapse, fever, profound toxemia, headache, usually frontal, sometimes occipital, aching limbs, vertigo, drowsiness or insomnia, broken dreams. Rigors are rarer than chilly sensations. There may be a sense of weight in the head, like that from inhaling coal gas (Griesinger); the face is drawn and haggard, eyes red, sunken and staring, pupils often dilated; the face may wear a look of horror or fear. The patient, if he can walk, drags himself about in a dreamy way, or staggers about. There may be nausea, vomiting, or diarrhea. The speech is heavy and stuttering; the sensorium dulled, with tremors, sense of internal heat, and injection at the inner canthus. These symptoms may last a few hours, several days, or be absent.

The fever may set in abruptly or follow the above. The temperature rises to 103 to 107°, the pulse and respiration rising commensurately. The rise is slower than in malaria. The skin is dry and burning, face swollen, eyes more injected, sunken and fixed, hearing dull. The tongue is swollen and heavily furred, soon turning black, while sordes form about the teeth, lips and nostrils. Prostration is extreme, the patient being able only with difficulty to make known his tormenting thirst. Noisy delirium may follow; more frequently he sinks into typhoid stupor, picking at the bed-clothes. Coma, convulsions, perhaps tetaniform, retention of urine, subsultus tendinum, etc., may follow. Vomiting may be present, constipation or diarrhea, the liver and spleen are enlarged, the urine is scanty but rarely shows more than a trace of albumin; the pulse loses its fullness, becoming weak, small, fluttering, dicrotic or intermittent. The heart dilates later, the first sound growing obscure, and cyanosis may precede death. Griesinger speaks of a painful sensation of heat in the epigastrium, not quieted by fluids. Stupor becomes prominent on the second or third day. Hematuria may occur, or total suppression of urine. Bronchitis, epistaxis, wild furious delirium, are occasional features.

The buboes may develop at any time from the first to the fifth day; Griesinger says from the second to the fourth day. In 70 per cent of the cases they appear in the groin, usually the right, affecting one or more of the inguinal glands; in 20 per cent it is in the axilla, in 10 per cent (mainly in children) in the gland at the angle of the lower jaw. There is usually but one—in  $\frac{1}{3}$  of the cases they are developed on both sides, symmetrically. Occasionally they are found in the popliteal, epitrochlear, or in the other cervical glands; or in several locations at once. The buboes vary in size from a walnut to a goose-egg; they may be very painful or but slightly so; they are surrounded by brawny infiltration. Carbuncles or local areas of gangrene sometimes follow the buboes, on the legs, neck or back; they may spread and destroy large parts of the skin, etc.



In favorable cases the fever and other symptoms moderate as the buboes appear or as they mature; free sweating occurs, the tongue moistens, the pulse slows and fever subsides, delirium abates. The swellings soften and discharge offensive pus, or very slowly resolve. The gangrene is demarcated, urine becomes free, and convalescence commences from the sixth to the tenth day. Local secondary suppurations may occur, or the buboes heal sluggishly. The typhoid state may continue till the end of the second or even the third week. Or another stage may develop, with irregular fever, parotid suppurations, malaria and other evidences of septicemic invasion.

Hemorrhages are frequent features—ecchymoses of various sizes, vibices, bleeding from the nose, mouth, lungs, stomach, bowels or kidneys. Some epidemics are especially hemorrhagic. Hemoptysis and pneumonia mark unusual malignancy. Pregnant women abort, the fetus showing evidences of the infection. Death may ensue at any stage, from collapse, heart-failure, coma, convulsions, hemorrhages primary or secondary, or exhaustion. Convalescence may be quite rapid, or slow and interrupted by suppurative sequels.

In the *pestis siderans* the system is overwhelmed at the outset by the intensity of the infection, and death follows in a few hours. Pneumonic plague is specially formidable on account of the mortality and the spread of infection by sputa. The attack commences like an ordinary pneumonia, with rigors, malaise, intense headache, vomiting, general aching and fever; followed by cough, dyspnea and profuse thin blood-tinged sputa. Mucous rales are heard at the bases of the lungs, respiration is hurried, delirium supervenes with evidences of the gravest prostration, and death ensues about the fifth day. Direct primary infection of the respiratory mucosa is here present. The physical signs may be limited to one or more lobes. The bacilli are found early in the sputa. Recovery is exceedingly rare in this form of plague.

Abortive forms occur in all epidemics, becoming more frequent toward the close. The buboes may be attended with little constitutional disturbance and are apt to undergo resolution. Sudden collapse has been noted. Similar epidemics of bubo may precede or follow true plague; whether these are due to the plague infection always is not determined.

The mortality varies in epidemics; it is greatest at the beginning; the total rate being from 60 to 95 per cent. At Hong Kong the mortality among Chinese was 93.4 per cent, among Indians 77 per cent, Japanese 60 per cent, and Europeans 18.2 per cent, this corresponding closely to the ability of each class to secure skilled care and hygienic surroundings.

**Pathology:**—Ecchymoses are frequently seen at autopsies, especially at the sites of insect bites. In severe epidemics subcutaneous extravasations

are so prominent as to have given the malady the name of 'black death.' This title has also been attributed to black masses of clotted blood expectorated in the pulmonary form. Boils, pustules and abscesses may be present. Rigor mortis is slight. Post mortem muscular contractions and rise of temperature have been noted. Decomposition commences soon.

The brain, cord and meninges are congested, their fluids increased, cerebral sections show numerous bloody points, extravasations into the brain substance are seen. Serous ecchymoses are common and the serous fluids tinged with blood. Bronchitis and hypostatic congestion are frequent; less so are infarcts and pulmonary abscesses. The right heart and great veins are distended, the blood not firmly clotted. The liver is enlarged, its cells degenerating, the spleen over twice its normal size; the intestinal mucosa congested, ecchymotic, eroded, and ulcerated about the ileocecal valve; similar conditions obtain in the kidneys, the internal and external surfaces, while the surrounding tissues are congested; the ureters and vesical mucosa studded with ecchymoses and the urine contains blood. One or many lymphatic glands are swollen and congested; in and about them we find exudations, hemorrhagic effusions, glandular hyperplasia and enormous numbers of bacteria. The vessels connecting superficial and deeper glands are affected. The hyperemia in and around buboes is intense at all stages of the disease; the tendency to hemorrhages marked. At first the specific bacilli are found in the perifollicular lymph-spaces; later they are in the follicles and medullary cords. The lymphatic glands may be generally but mildly affected.

**Diagnosis:**—During an epidemic of plague we are warranted in looking on any case of fever with glandular hyperemia as that affection until proved to be something else. Pneumonic cases present difficulty. In any form the diagnosis is rendered positive by finding the specific bacilli in the sputum, blood, discharges or pus. The suspected matter is placed on a slide, dried, fixed, stained with aniline; any coccobacillus found with the poles stained is cultivated by Haffkine's method in broth on which cocoanut oil is floated. From the under surface of the oil the plague bacillus hangs in stalactite growths; which, when disturbed, fall in snowflake masses to the bottom of the vessel. No other known bacillus does this (Manson).

Serum diagnosis does not appear to be of much practical importance. It is not demonstrable until late in the attack or during convalescence, and as it fails in the majority of cases this failure does not prove the absence of plague. A little serum from the patient is diluted with three volumes of normal salt solution, and placed in culture media with plague bacteria, when these agglutinate in small clumps. This phenomenon also occurs in the serum of animals that have been immunized with plague bacilli.



**Prognosis:**—Bad signs are the seat of the bubo in the neck, the primary pneumonic form, the early appearance of the bacilli in the blood, or of severe constitutional symptoms with little glandular disease. The height of the fever is less significant. Sudden death from heart failure may occur in cases apparently doing well. Intense implication of the nervous system or of the gastrointestinal tract is unfavorable. Otherwise, prognostic indications may be drawn from the resisting powers of the patient, the period of the epidemic, his habits as to alcohol, etc., and his ability to command good nursing and attendance.

**Prophylaxis:**—Quarantine to be effective must extend over eight days from possible infection. Convalescents must be isolated from the community for a month after recovery, since Kitasato has shown that the plague bacillus is found in their bodies for at least three weeks after the attack has subsided. Clothes and other articles possibly infected should be burnt. Infected ships should be fumigated and the rats thus killed, and burnt or sunk, before communicating with the land. The plague bacillus is killed by a few minutes' exposure to steam at 100 C., by half an hour to a temperature of 80 C., by one hour to 1 per cent carbolic solution, or three hours to fresh whitewash. Manson recommends for disinfectants steam, 1 to 1000 mercuric chloride in carbol-sulphuric acid, 1 per cent chloride of lime, and 5 per cent carbolic acid solution. He advises strict isolation of affected patients, houses and towns, destruction of infected material by fire, cremation of the dead, formation of segregation camps for suspected and exposed persons, killing and burning rats and mice, general sanitation, and special protection against diffusion by railways. In India the inspection of all dead proved advisable. Cases of walking plague are specially dangerous. He then acknowledges the inefficacy of quarantine. The enforcement of hygienic precautions, including the killing of rats and other vermin when a visit of plague is feared, is urged.

Individual prophylaxis calls for avoidance of unnecessary exposure, scrupulous hygiene of the sick-room, protection of nurses from insects' attacks, and prevention of infection by sealing wounds and abrasions.

Haffkine prepared a culture of plague bacilli, killing them by heat, and employed it by inoculation as a preventive, with considerable success; reducing the number of those attacked by about 4-5, and rendering the attacks milder. Others have obtained success less marked but still quite satisfactory. Lustig modified the serum by precipitating the nucleoproteids which could then be kept indefinitely in a dry state and administered in weighed doses. Similar cultures employed by successive inoculation to render rabbits and horses immune have furnished the serums of Yersin and

others. These have been employed as remedies with sufficient success to encourage further experiment in that direction.

During the last epidemic in Sidney all quarantine restrictions were thrown aside, and patients treated on the principle of preventing the possibility of access of insects to the patient or the infection of epidemic lesions, while all material by which rats might become affected was carefully destroyed. This proved successful, and neither nurses nor physicians were attacked (Lydston). No pneumonic cases occurred; these probably require isolation.

**Treatment:**—Manson calls attention to the tendency to depression always present, contraindicating depressive measures. Much relief may be obtained from fever and headache in the early stages by applying ice bags to the head: warm sponging is safer than coal tar febrifuges. Lowson relieved vomiting with calomel followed by a saline. If this failed or if diarrhea began he advised 'ice pills' and an effervescing mixture containing morphine and hydrocyanic acid. When the pulse showed signs of failing he advised strychnine and ammonium carbonate rather than direct heart-tonics. He began with strychnine early and gave it as a routine remedy. In collapse stimulants—ammonia inhalations, ether injections—sometimes succeeded. Morphine he found the best hypnotic. Hyoscine, chloral and bromide were of service; all in small doses. Urgent diarrhea he found best treated by intestinal antiseptics—salol gr. x every four hours. To the buboes he applied glycerin and belladonna; poulticing when red, incising when soft and dressing with iodoform, treated with iodine when indolent.

Extirpation of the affected glands has been tried without success. Wilson urges the use of alcohol and in the next sentence acknowledges its inefficacy. Hydrotherapy also has failed.

Get rid of the impression that veratrine is a 'depressant.' The restoration and maintenance of normal elimination is never depressing; and in all maladies which throw on the eliminant apparatus an enormous burden of debris that must be carried off, eliminants are the most powerful known means of raising the vital powers. By this means the heart may be more effectually sustained than by administering any quantity of cardinals. Nevertheless Lowson's suggestion is wise, and it is well to forestall the occurrence of heart-failure in a malady where it appears so unexpectedly and overpoweringly, by beginning the use of strychnine in moderation quite early in the attack. The use of these remedies in small and oft-repeated doses enables the physician to accurately gauge the effects and avoid the dangers of over and under dosage.

J. C. Thompson of Hong Kong finds phenol in great doses the most effective remedy, giving 12 grains every 2 hours, 12 doses each day, well diluted.



Saturation with calcium sulphide as a preventive and a means of destroying the parasites in the body, is a legitimate experiment and should receive the fullest trial. Especially is this measure indicated in those exposed to this infection but not yet displaying the symptoms. If there is the remotest chance that this remedy will destroy the first invading horde before they have multiplied sufficiently to inaugurate the sensible symptoms, the remedy being harmless if ineffective, it should not be neglected.

Another remedy for whose use there is a sufficient basis of probability is pilocarpine, in full diaphoretic doses at the outset. The closely allied remedies, physostigmine, picrotoxin and muscarine, may in time be investigated in microbic infections. Especially in pulmonic forms should this group receive trial, the old treatment having so conspicuously failed here. Possibly the application of local germicides, like thymol iodide in an oily menstruum, to the bronchial mucosa, may prove beneficial. Less probable expedients have proved successful in our art.

In regard to the fulminant cases, where the patient dies in a few hours, overwhelmed by the virulence of the attack, there is not a word as to treatment mentioned by any authority in our library. They unanimously give these cases up without an effort. We are not 'built that way;' if die we must, we prefer to 'die fighting.'

In the eruptive fevers we meet a closely analogous situation—the eruption does not appear but the patient dies in a few hours overwhelmed by the vehemence and suddenness of the onslaught. Sometimes we are enabled to stay the hand of death by arousing the patient's vital resistance; and for this purpose we administer camphor, capsicum or other local irritants that powerfully stimulate the gastric terminals of the afferent nerves. In the choleras, tropical dysenteries and pernicious malaras, this therapeutic principle has proved applicable and has saved many lives. With all to gain and nothing to lose, it seems worthy of consideration here. Another remedy for this condition is atropine, full doses hypodermically. With this glonoin and strychnine may be combined, making an efficacious remedy for the condition described.

For collapse there is one remedy not mentioned yet—the very hot, stimulant bath. Anyone who has witnessed recovery from cholera collapse when the patient is placed in a hot mustard bath and hotter water added till reaction occurs, will comprehend the value of this suggestion.

#### *Resume.*

<i>Preliminary:</i>	Calomel	to arouse liver
	Saline	to empty bowels
	Sulphocarbulates	to deodorize stools
<i>Dominant:</i>	Calcium sulphide for infection	



<i>Variants:</i>	Aconitine	to allay fever
	Digitalin	to sustain heart
	Strychnine arsenate	to incite vitality
	Veratrine	to open elimination
	Nuclein	to reinforce phagocytes
	Pilocarpine	to incite leucocytosis
	Capiscin	to arouse vital resistance
	Atropine	to arouse vital resistance
	Glonoin	to hasten action of other remedies

## ERYSIPELAS

Erysipelas is a contagious malady, endemic, sometimes epidemic, caused by the streptococcus erysipelatus or pyogenes. It is somewhat more frequent in the spring. It haunts unhygienic hospitals and other institutions. It is inoculable and portable by an unaffected person. The liability to it is universal but to permit the entrance of the cause it requires a lesion of the surface of the body, though this may be exceedingly slight. Alcoholism, nephritis and debilitated conditions in general are predisposing causes; and one attack seems to render the victim more liable to others. The symptoms are due to the toxins produced by the coccus, and a protective serum has been produced, Marmorek's, by intensive inoculations of the horse. It is a bacterial and not an antitoxic serum. Its value has not been fully demonstrated. There are a number of streptococci which can not well be distinguished, and the serum from each protects only against that one; and erysipelas may be caused by more than one of these organisms.

Erysipelas is a dermatitis, with edema, the cocci occupying the lymph spaces, abounding in the spreading edges. Beyond the margin of redness they are found in the lymphatic vessels, where they wage deadly war against the defending leucocytes, according to Metschnikoff. In severe cases there is suppuration. It may pass along the planes of fascia to the deeper structures. A sailor under the writer's care had a boil on the forehead. He visited a friend suffering with erysipelas, this affected the boil which had opened up the deeper structures of the scalp, the infection traveled through the orbit to the brain, and the man died of meningitis.

Erysipelas may cause septic infarcts, pyemia, endocarditis, pleurisy or pericarditis, pneumonia or acute nephritis.

The incubation is from three to seven days, perhaps less. The invasion may be marked by chilliness with acute fever; the skin lesion is surrounded by a rosy zone which widens rapidly, spreading by the edges. It is most frequent on the face, beginning at the mucocutaneous margin, most often at the outer corner of the eye. The skin is swollen and tense, red, hot,

sometimes the epidermis raised in blisters, large or small. The margin is well-defined and raised. The eyes swell shut. The fever rises to 102 or 104°, and as the scalp is involved delirium is common. The glands swell but may be hidden by the general edema. Leucocytosis is present. Leucin and tyrosin have been found in the urine. In weakly and cachectic persons delirium and prostration supervene quickly; or the malady may be characterized by pronounced asthenia from the first. The eruption is then pale, pulse weak and fever slight. The tongue soon becomes dry and depressing toxemia threatens death. The eruption may extend to the mucous membranes and edema of the larynx become a dangerous complication.

Usually the disease does not progress beyond the head, but sometimes it passes to the chest and may irregularly traverse the whole surface of the patient. When the entire head is affected the disfigurement is great. Abscesses are common about the face, and sometimes the deeper planes of connective melt away and large collections of infective pus form.

Albuminuria is usual, especially in elderly subjects. Malaria may coexist. During convalescence Da Costa noticed febrile recrudescences.

Diagnosis is made by the onset, rapid rise of fever, the regularly spreading rosy flush, and fading which commences four days after it has reached any location.

The prognosis is good, except for the aged and cachectic, drunkards, and when the meninges are affected. Attacking newborn infants at the navel it is fatal.

Twenty-five years ago the writer first used jaborandi for erysipelas. The patient was a husky beer-drinking woman, whose face was nearly covered with the flush. She was given fluid extract of jaborandi, m. v. every hour till sweating began. By this time the erysipelas began to recede from its edges. The remedy was then suspended, and next day the eruption had begun to regain its lost ground. For some days this alternation was pursued, until it was evident that the remedy had perfect control over the disease, and then it was given until the flush had completely disappeared, and the woman was well. The next case was similar; a physician preceding the writer had placed the patient on large doses of tincture of iron, at each of which she became wildly delirious. Jaborandi exerted the same complete control over the erysipelas and she was soon well. For years the same result followed in every case, the only difference being in the substitution of pilocarpine for jaborandi, after the failure of the latter in one case, owing to lack of pilocarpine and an over-plenty of jaborine.

One day a case presented in which pilocarpine failed to cause sweating or salivation, or to influence the erysipelas beneficially; but each dose was followed by an increase in the already marked depression under which the



patient labored. In this case the asthenic form presented, with pale eruption, slight if any fever, weak pulse and general prostration. The treatment was changed to tincture of the chloride of iron, thirty drops every four hours, and nourishment crowded; improvement set in at once.

This is the history of erysipelas in the writer's practice for twenty-five years since. Every sthenic case recovered under pilocarpine; every asthenic case under iron. No deaths.

No local treatment—why should one use it?

Le Grix describes a case of facial erysipelas, an English lady, aged 25 years. The malady developed upon a coryza, at the margin of the interior nares, and spread over the face. She was first seen three days after the beginning of the attack. The malady had extended to the neck, where many glands were enlarged and painful; the lachrymal sacs suppurating, the eyes closed. She vomited spontaneously, had a most violent headache, with nightmares all the preceding night; constipated, urine scanty but not albuminous, tongue heavily coated, throat red, nostrils dry, pulse 120, temperature 40.5 C.

She was placed upon aconitine, veratrine and calcium sulphide, two granules each, with one of strychnine arsenate, given together every half hour. After the sixth dose the fever had fallen to 38.5 C. She passed a good night. Next morning the temperature was 37 C. The same remedies were given every three hours, adding one granule of digitalin three times a day. Improvement was evident; the head was clear, sensibility less, the headache had disappeared. A saline laxative was given each morning. The menses appeared prematurely without pain.

On the second morning of treatment the temperature was 36.8 C. but rose in the evening reaching 39.8 at 6 p. m. This was followed, however, by a good night. In the morning the temperature was 36.8 C., the face desquamating but the eyelids had swelled again. The granules were given every two hours and the temperature rested at 37 degrees C. from noon till midnight. The eruption subsided rapidly, the hairy scalp remaining tender with some edema. The urine became more abundant and clearer. She was dismissed as cured on the fifth day of the treatment.

The reporter remarks that the evolution of a facial erysipelas so extensive, intense and acute, is remarkable for the rapid jugulation of the fever, treated at the end of the second day from its appearance, disappearing totally in twelve hours, reappearing twelve hours later and finally vanquished six hours after the second attack. Jugulation followed the first six doses as given above. This case was remarkable also by the appearance at each menstrual epoch of facial congestion.

## DIPHTHERIA

The term diphtheria had better be limited to cases presenting the Klebs-Loeffler bacillus, in the interest of scientific accuracy. Some of these are simple sore throats, but they may take on the features of malignancy whenever conditions favor this development. There are other cases presenting the clinical features of malignant diphtheria in which this bacillus is not found, but that is not positive proof that it is not there nor that they may not become affected with this organism subsequently.

Clinically, it is safe to look on every sore-throat as possibly diphtheritic now, or at any time in the near future, and to take all known precautions against its becoming so.

Diphtheria is a disease characterized by pseudomembranous deposits on diseased mucous membranes and upon sores or mounds, with toxemia from absorbed poisons therefrom. Diphtheria is always to be found in our cities and becomes epidemic at times. It also prevails in isolated country places. It is contagious but much less so than scarlatina. The sources of contagion are not easily traced. It clings to infected houses and drains, attacking families that successively inhabit unhygienic dwellings. The writer knew one such house, where the cess-pool filled with water from a spring and overflowed under the kitchen, where the floor was constantly saturated with sewage. All the children died of diphtheria; and every family that occupied that house for ten years lost its children in this way.

In Germantown, Pa., the rivulets forming the head of Wingohocking Creek drained several cess-pools from houses in which diphtheria existed. The stream was covered over part of its course with a sewer, and along that portion there was no such disease; but when the cover ended and the creek formed an open sewer, in houses about the mouth of the culvert residents were affected with diphtheria.

In the city while scarlatina and smallpox could be traced with ease, it was impossible to locate the source of diphtheritic infection in most instances. In one case infection seemed to have been carried to an isolated farm-house in a barrel of apples from an infected place. It was reported that the bacilli were detected in decayed spots in the fruit.

The infection may be communicated from the membranes and discharges of patients, from the secretions of convalescents, or be carried by healthy persons in contact with patients. The viability of the germs seems to have no limit, and they have been detected in the throats of patients for a year after an attack. Many physicians and nurses have fallen victims to bits of infected material coughed into their mucous tracts, or taken in while clearing tracheotomy tubes. The bacilli have been found in dust of infected



rooms, in the feltlike growth of pipes leading from stationary basins to sewers, in the hair of nurses, in milk and cheese. It is generally believed that cats are affected and spread the disease, but Osler denies this.

Some persons are immune at some times. Any age is liable but most deaths occur between two and five years. Adults are liable. The disease prevails most in winter. Any affection of the pharyngeal mucosa opens the door for diphtheria. The writer has seen the deposit in a suppurating ear. Epidemics vary in malignancy, and fatal attacks may come from inconsequent and non-membranous sore-throats. In the West Indies there prevails among natives a harmless affection from which northern visitors contract fatal diphtheria.

The specific bacilli are found in the membranous deposits and do not penetrate the tissues in large numbers. They may reach the blood and be widely disseminated by it. This may be the only organism found in the attendant bronchopneumonia. It has been detected in endocardial ulcers. It is non-motile, from 2.5 to 3 micromillimeters in length and 0.5 to 0.8 in width, a straight or bent rod, with rounded ends, sometimes swollen or branching. Growth in cultures ceases at 20° C. It is very tenacious of life. Its virulence varies widely. It has been detected in ordinary catarrhal pharyngitis and laryngitis, in follicular tonsillitis and in throats presenting no evidence of disease. The antrum has been found to be infected.

Roux and Yersin isolated a toxin which is the direct cause of death by diphtheria but does not produce false membrane. Attenuated cultures of the bacilli, or dilutions of the toxin, injected into a susceptible animal produce a febrile reaction, that grows less with each repetition until it ceases and the animal is immune.

The most important other organism found with the diphtheria bacillus is the streptococcus pyogenes, which may infect the system. Others are the micrococcus lanceolatus, bacillus coli communis, staphylococcus aureus and albus, bacillus xerosis, etc. Non-virulent bacilli resembling that of diphtheria have been found in many diseases. In membranous affections where Loeffler's bacillus is not found, the streptococcus pyogenes is usually present; also in diphtheritic bronchopneumonia. These occur in a varying proportion of cases in an epidemic of diphtheria, also in scarlatinas, measles, whooping-cough and typhoid fever. These cases are less dangerous than true diphtheria, except in the fevers, when general infection is not uncommon. There may be a simple catarrh or a creamy pultaceous exudate; or follicular tonsillitis, the deposit spreading over the pharynx and sloughing ensuing. They are slightly if at all contagious. The most extensive paralysis may follow.

**Anatomy:**—In 127 fatal cases the membrane appeared on the larynx in 75, trachea 66, tonsils 65, epiglottis 60, pharynx 51, nasal mucosa 43, bronchi 42, soft palate and uvula 13, esophagus 12, tongue 9, stomach 5, vagina 2, duodenum, vulva, external ear and conjunctiva 1 each (Osler).

The accessory sinuses were frequently involved. The membrane dips down into the mucous tissues and so interferes with their blood-supply that necrosis or gangrene results. The membrane varies from white to gray, greenish, brown or black, being most frequently ashy. Ulceration may open the carotid artery. Any of the nasal passages or sinuses may be blocked up with exudation and necrosed tissues. The affection may spread along the nasal mucosa to the sphenoid, ethmoid or frontal cells, by the eustachian tube to the ear, or the nasal duct to the eyes, to the antrum, malar bone, larynx and trachea, rarely to the esophagus and stomach, more frequently to the mouth, causing ulcers at the corners. The anterior nares may be eroded. Where the mucous membrane is rich and succulent the disease penetrates deeply, the destruction of tissue is great, and the neighboring lymphatics are involved. If the membrane is thin and scantily supplied with blood and the lymphatic connections few, the membrane is "croupous," and the lymphatic involvement slight. The membrane may be tenacious or pulpy. The first action of the bacilli is local; the primary lesion necrosis of the epithelium; the organisms grow in dead, not in living tissues. Active proliferation of cell nuclei precedes necrosis, and fibrinous exudate pours out underneath, forming fibrin in contact with necrotic epithelium. Part forms a network around the exudation cells and dead epithelium, part combines with the hyaline degenerated cells. With or without it a hyaline membrane may be formed, the fibrin probably dipping into the tissues. The cells which it surrounds disappear. The membrane disintegrates from the surface inwards, or is pushed off by exudation. It never begins on a sound epithelium but extends over it. The connective and vessels undergo hyaline fibrinous degeneration. Necrosis may extend deeply but there is little tendency to abscess. The degeneration of the mucous glands is almost specific.

In the heart we find fatty degeneration, primary and secondary myocarditis, rarely peri and endocarditis, the Loeffler bacilli in the vegetations. Bronchopneumonia causes as many deaths as the throat disease. Pneumococcus pneumonia is rare, diphtheria bacilli and streptococci frequently infesting the lung. The kidneys are affected by the toxins, varying from degeneration to intense nephritis. The liver and spleen are degenerated as in other acute infections. General infection occurs in grave cases, with the diphtheria bacillus or streptococcus, or both.



**Symptoms:**—The incubation lasts from a day to a week. The onset may be marked by chilliness, fever, aching head, back and legs, the temperature reaching  $102^{\circ}$  to  $104^{\circ}$  F. Convulsions may occur in children. Rarely do patients mention the throat unless asked of it; the usual complaint is of headache. There may be no complaint; the writer has called a child in from its play four hours before its death. Never omit to examine the children's throats when diphtheria is about, and the mother apologizes for troubling you, but fears "the child may not be just right." You will find the tonsils red, a little stiff, and a thin pellicle of membrane, ash-tinted, closely adherent. The child does not say there is soreness on swallowing, but may if asked. The membrane thickens and spreads by the edges, sometimes with rapidity. The glands at the angle of the lower jaw are swollen and tender. Detach the membrane and a raw surface is left, with bleeding points. The deposit is soon reproduced. There may be no fever or acceleration of the pulse. This may comprise the whole attack, and within a week the membrane is detached and the patient convalescent. In fact, many cases run their course without exciting suspicion of their true nature.

According to Koplik there are cases of simple catarrh with croupy cough, others with a pultaceous exudate on the tonsils, some with a punctate membrane, isolated; and some with a typical follicular tonsillitis. These may run a mild course or take on malignancy, or extend rapidly. Heubner describes a latent form, in weakly strumous subjects, with fever, nasopharyngeal catarrh and digestive trouble, with nothing indicating diphtheria till laryngeal symptoms develop; or it may be found only at the autopsy.

Even with severe implication there may be slight systemic infection, Or, there is great prostration, high fever, pulse fast and weak, hebetude rather than delirium and the patient dies soon of toxemia. This has never occurred in the writer's practice except when the nose was affected. The temperature may be subnormal; in fact fever is not a feature of diphtheria, *per se*. But when extensive tracts are involved and toxic products are being absorbed, the discharges fetid, there may be fever above  $104^{\circ}$  F., the end of the nose, fingers and toes cold, the forehead burning hot, pupils contracted, mind clouded or comatose, face pale, the glands swollen, both lymphatic and salivary. Suppuration or gangrene may set in, but never has the writer seen such extensive destruction as in the angina of scarlatina. Escherich accounts for the divergence by assuming that there may be a high local susceptibility to the malady with a slight general impressibility, or *vice versa*. Leucocytosis is usually present in all grades of the disease.

Sometimes, when the affection on the tonsils has progressed a day or more, there appears a slight coryzal discharge from one or both nostrils. Let alone, this soon becomes turbid and irritating, excoriating the nostril and causing intolerable burning. The discharge becomes ichorous and frightfully offensive, and blood appears, which will go on to fatal epistaxis if not successfully treated. The affection then spreads to the mouth, causing ulceration of the gums and at the corners of the mouth as well as the inside of the cheeks; to the ears, causing earache, deafness and otitis media with penetration of the drum and the appearance of the exudation in the external meatus; along the nasal duct, with ulceration at the inner canthus of one or both eyes; or to the larynx, causing hoarseness and aphonia, with the symptoms of membranous croup in children.

The writer does not believe all cases of membranous croup are laryngeal diphtheria. The Klebs-Loeffler bacillus was found by Park and Bebeerin in only 229 out of 286 cases. The reaction of the two maladies to treatment is different. The symptoms are similar—the croupy cough, hoarseness, aphonia, worse at night, with impeded inspiration, and the boat-shaped depression of the abdomen calling for tracheotomy or intubation.

Diphtheria may begin in the conjunctiva, causing catarrhal or membranous disease; or in the ear if there is suppuration there. It may attack any wound, ulcer or other lesion of the skin if not protected by impervious coverings. The course is similar to that on the mucosa. Paralysis may follow either. Diphtheria of the genitals is rare.

Dangerous hemorrhages may occur from the nose or throat. Erythema, urticaria and purpura occur sometimes. Catarrhal pneumonia is present in most fatal cases. Jaundice is catarrhal and not serious. Albuminuria is present in all serious cases. If abundant, with blood casts, it indicates alarming nephritis. Suppression may follow, rarely with dropsy, coma and convulsions. Any organ may be infected by the transmission of septic matter through the blood. Paralysis is the chief sequel. It may follow mild forms. It is more frequent in adults. It usually affects the muscles of deglutition, but the writer has seen it in about all the rest of the muscular system except this. It is due to septic neuritis, multiple or confined to a part. Many die. The paralysis may be permanent.

One death in five is due to heart-failure, usually in the second week. Slowness of the pulse is a serious symptom. The patient is pallid, the pulse weak and slow or fast, the extremities cold, and collapse supervenes with death in a few hours. This may occur during convalescence, after



exertion. There may be no physical signs other than slight increase in the cardiac dullness and a gallop rhythm or embryocardia, indicating dilatation (Osler).

**Diagnosis:**—The only real proof is the demonstration of the presence of the specific bacillus. Place the child in a good light, properly held; depress the tongue and rub a cotton swab gently but freely against any visible exudate; if not visible avoid the tongue and pass the swab far back and rub freely against the pharynx and tonsils; without laying it down withdraw the cotton plug from the culture tube, insert the swab and rub that portion that has touched the exudate gently but thoroughly all over the surface of the blood serum. Do not push the swab into the serum or break its surface. Replace the swab in its own tube, plug both tubes, put them in the box, and return at once to the station. The above are the directions of the New York Health Department. The tubes are kept at 39° C. in an incubator for twelve hours, and then examined. Laryngeal cases may not show the bacilli at the earlier examinations. It is safe in all possibly diphtheritic cases to look upon them as such until proved innocent, and take all precautions as to treatment and isolation.

Streptococcus cases are usually milder, less infectious, but bad enough to make the above apply to them also.

In the Boston City Hospital the mortality was 46 per cent; since the introduction of antitoxin it has fallen to 12 per cent. The prognosis is so largely influenced by the treatment that it is difficult to estimate without taking that into consideration. Bad hygienic surroundings are often fatal. Extension to the nose or any of the passages communicating with the pharynx is the signal for a fight for the patient's life; extension to the larynx is generally an indication for the undertaker. Marked nervous implication, hebetude, heat of head and cold extremities, great depression and contracted pupils, signify sapremia, and while serious are amenable to treatment. Scanty or suppressed urine with acute nephritis is ominous. The disease is essentially covert, insidious, and the mildest case must be watched carefully, even through the convalescent period. The paretic sequels are often, but not always, amenable to treatment.

**Prophylaxis:**—The patient should be isolated, the clothing disinfected, the sick child kept from school until the infective period has passed. But this means until the bacilli have disappeared from the throat, and only by repeated bacteriologic examinations can this be determined. Many of the dangers are obviated if the patient is removed to a special hospital for such cases, which is one of the most difficult problems in city hygiene. Few mothers willingly part with their children with an apparently slight ailment to send them to a hospital among malignant cases.

In case of death, the body should be invested in antiseptic wrappings, hermetically sealed, and buried—or, infinitely better, cremated—at once, with no funeral permitted.

A great advantage gained by the use of local germicides is the lessening of infective possibilities. Such remedies should be applied to the throats of every member of the family several times a day.

**Treatment:**—The history of diphtheria is a record of the stubborn determination of the medical profession to treat it as a constitutional affection, in spite of the most glaring proofs of the superior efficacy of local applications. An instance of this occurred many years ago in Paris, where the regular faculty was losing its cases, and an old woman in an alley was obtaining such success that a committee was sent to ascertain the reasons. It was found that her main reliance was on local applications of silver nitrate. But there are better local remedies than this.

For over half a century chlorine has occupied a high place in the estimation of those who have tried it. The original formula appeared in Greenough's work on Diphtheria, as follows: Potassium chlorate, powdered, one dram; put in a four-ounce vial and add a dram of strong hydrochloric acid and two drams of tincture of chloride of iron; when the fumes of chlorine rise in the vial add water to make four ounces. The dose of this is a dram, *undiluted and with no water after it*, to be repeated every one to four hours, for any age above a year. As it is quite a strong acid solution it is well to give water before each dose, to dilute it in the stomach. In a few cases where it erodes the mucous membrane, and for children under a year, it may be applied on a swab instead; but when it can be swallowed it reaches the affected parts better and has a valuable effect as a general stimulant besides. It is rare for any child to refuse it; the burning from the disease in advanced stages is so great that the writer has seen a two-year-old boy rise on his elbow and beg for the dose which momentarily stops this distress.

But this is not enough; it is as frequent as the remedy should be applied, but not enough to stop the progress of the diphtheritic process. The bacillus never sleeps; the exudate spreads with frightful rapidity; one can almost see it grow before his eyes. And when we try to put out a fire we must not stop a moment until it is all out, or it will relight and our labor go for nothing. Wash out the affected area with peroxide of hydrogen solution, the full strength of the 15-volume, and repeat this every quarter-hour while the patient is awake and every half-hour while asleep. There is really no objection to waking the child; it is but a minute and the child is asleep again, so that his rest is not disturbed. But let a mistaken tenderness leave him a few hours without the medicine and the disease



may have penetrated beyond the reach of local remedies. And it must not be forgotten that one thorough application is worth more than a dozen partial or slovenly ones. Again the simile of extinguishing a fire is applicable.

The local remedies must be strong enough and applied often enough, to accomplish their purpose, or they will fail. It is the lack of appreciation of the truths herein set forth, that leads physicians to undervalue the importance and efficacy of local antiseptics.

If the child resists the applications and it is necessary to use force, let the nurse take it in her lap with the back to you; then rest the back of its head in your lap, and hold the nose shut for a moment until it opens its mouth; then slip a large cork in to hold the mouth open, and the application may be thoroughly made in a moment. It is rarely necessary to repeat this procedure; the relief following will make the child willing to have the remedy applied.

Doubtless other applications are as useful as those recommended; we speak of those we have learned to trust after a third of a century's use. Osler speaks highly of Loeffler's solution: Menthol, 10 drams, dissolved in toluol to 36 cc., liq. ferri sesquichlorati 4 cc., absolute alcohol 60 cc. Lactic acid dissolves the membrane without affecting healthy tissues much. Salicylic acid in saturated solution is especially effective as a lotion in streptococcus cases.

When the first traces of coryza show invasion of the nasal tract, syringe with silver nitrate, one per cent, or five grains to the ounce of water; repeat every four hours as long as the discharge appears. In the intervals use peroxide freely every quarter and half-hour as above described. If there is a trace of blood from the nose, make a solution of chromic acid, a grain to the ounce, and syringe with it the affected nostril. If necessary increase the strength until it stops the bleeding. This has never failed in the writer's hands. Loeffler's solution diluted as little as possible is also effective against the coryza. If the larynx is affected there is little hope, unless from internal treatment. The writer has never seen benefit derived from steaming. Ice to the neck and ice or ice-cream by the mouth, are always useful—a fact noted long before the inhibitant action of cold on these bacilli had been demonstrated. When in the laryngeal form the abdomen is retracted on inspiration, intubation should be at once performed, before suction has produced pulmonary edema.

The food should consist of the richest nutriment the child can digest, in small doses, taken every two hours. Predigested foods, ice-cream, *café au lait*, scraped raw beef and oysters, concentrated beef powders, bovine, sanguiferrin, clam broth, turtle soup, egg-white in ice-water, and fresh fruit juices, are best.

No internal remedy has won the repute of calcium sulphide. When this was introduced to regular medicine by Ringer it was advised in doses of gr. 1-10 every hour. We now know that it is safe and effective in twenty times this dose. A physician in Salonica, using little doses, had notable success with this agent and published his success. Just then he met a series of malignant cases, and the sulphide failed; whereupon he hastened to retract his encomiums. Had he increased his doses, at the same time attending to the unhygienic conditions that induced malignancy, his success would have been equal to his first experiences.

Give calcium sulphide to a child of two years, in doses of a grain every hour, until saturation is denoted by the odor of sulphureted hydrogen on the breath and skin, or until nausea occurs. The beneficial effects will be unmistakable. Continue the drug in smaller doses to keep up the effect until the membrane has come off.

So necessary is it to sustain the heart, and so insidious is the debilitating action of the toxin, that it is wise to give moderate doses of strychnine from the start; and to increase them when there is any sign of weakening circulation.

THE TOXIC SYMPTOMS ARE DUE TO SAPREMIA, NOT SEPTICEMIA. This is proved by the effects of cleaning away the morbid matter that is being absorbed. Take a child whose nasal tract is infected and packed with membrane and necrotic tissues, whose horrible stench drives everyone from the room. The child lies with eyes half shut, pupils contracted, stupefied, the nose and extremities cold, the forehead burning hot, pulse fast and thready, temperature high, or sub-normal. Wash out the affected cavities with peroxide, do it thoroughly—and consciousness has returned, the eyes are normal, pulse strong, temperature equalized, and the child is sitting up and asking for food and her toys. Could this occur if the toxins had not been absorbed from the tract just cleaned?

A typical case: A child two years old, red hair and the delicate fragile skin that accompanies it; living in a dark unventilated court in a great city; family poor, father a drunkard, big family in a three-room house, hygienic conditions very bad. Two accomplished physicians connected with a great medical university had been in attendance and had given up the case as hopeless—with which prognosis the writer fully concurred. The disease had penetrated to the nose and had infected the whole tract, the drums of both ears had given way and were discharging, at the inner corner of each eye ulceration had begun, the upper lip and the corners of the mouth were ulcerated, and from all this extensive territory poured a flood of that ichorous matter whose terrible odor we have already mentioned more than



once. This was before the day of antitoxin, and past the time-limit of its efficacy at any rate. There was little to hope, the case was desperate—but the prospect for a battle royal—for such a fight as arouses every drop of Irish blood in one's veins. So—off with the coat and up with the sleeves—this was a chance for a doctor who loved his profession for its opportunities for just such work. The system of treatment above detailed was put in operation, with tincture of iron as the main standby internally—no sulphide yet; the chlorine mixture was given in half-dram doses every two hours, and peroxide faithfully used as above. The father kept sober, and fully comprehending the conditions, carried out the plan as thoroughly as any trained nurse could have done. Six quarts of peroxide solution were used in six days, at the end of which the child was out of danger. No erosion of the membranes followed either the strong chlorine solution or the peroxide, which was applied in the full 15-volume strength.

One looks back on such triumphs with a satisfaction greater than that following the receipt of a thousand-dollar fee for performing an unnecessary operation on a trusting patient.

We come now to antitoxin: There is no reasonable doubt now as to its efficacy; so much so that no physician is justified in permitting a patient to go without it. When by repeated inoculations an animal has been rendered immune, the serum from that animal's blood, will when introduced into a human being's blood, render that person likewise immune against infection with diphtheria, and cure it if not too far gone. Antitoxin is measured by units, one being the quantity necessary to neutralize in a standard guinea-pig 100 times the minimum fatal dose of standard toxin. The dose to be administered is what will produce the desired effect; which may be 1,000 units or 50,000. We cannot know just how much toxin is being produced in any case, and what is produced must be neutralized be it much or little. When 'dose enough' has been given the membrane will shrivel, the nasal discharge lessen, the fetor improve, and the general state change for the better. If seen early the quantity required will be from 4,000 to 6,000 units. The objectionable features are hardly worth mention—urticaria and arthralgia, sometimes an abscess.

To protect from the malady persons not yet affected, injections of 300 units suffice for a child, 500 for an adult; to be repeated every few days while exposed to the disease.

By the use of antitoxin the mortality from diphtheria has been reduced from 38.4 per cent to 9.8 per cent.

The curative effects are greater the earlier in the attack antitoxin is administered. Larger doses are required for each successive day till the 4th, after which there is little benefit to be hoped, unless experience shall

show results from larger doses than are commonly given. But even here the antiseptic treatment described will save most of the cases. Without in any way decrying the use of antitoxin—which no reasonable man can do—we need not forget everything else we ever knew.

Post-diphtheritic paralysis calls for the treatment of such affections from ordinary causes—massage, electricity and strychnine, with passive motion—and patience.

Verette says that some very wise, distinguished and especially “official,” confreres wish to force upon us the use of antitoxin even with patients who are not ill, making it a case of conscience. He finds, however, that the serum is by no means a panacea, and that there are other remedies as good if not better for the cure of diphtheria; and since it has not yet been demonstrated that by itself alone the serum suffices to cure a confirmed croup, he prefers to maintain his independent opinions, and to employ a medication which before the discovery of the serum had proved effective, without having had the numerous failures and grave inconveniences met in the employ of antitoxin. What imports *magister dixit*? The master is too often mistaken, and is too often led into error, for us to accept without protest what he wishes to impose upon us. Independence is the brightest gem of the medical crown—perhaps the only one.

A child four years old, with typical diphtheria of the tonsils. The treatment consisted in the administration of calcium sulphide, with local applications of resorcin, iron and cocaine. Improvement was manifested on the following day, and in four days the child was well. Two younger children in the family were saturated with sulphide and escaped contagion.

Robert Tissot, after discussing the relative merits of calcium sulphide and antitoxin, reaches the following conclusions:

Antitoxin presents dangers and may by itself cause death. By its use the malady of diphtheria is reduced to 9 per cent.

Calcium sulphide given dosimetrically is perfectly inoffensive. By its use the mortality in diphtheria is reduced to 7 or 8 per cent.

Guinon and Netter report improved results from the use of collargol, by inunction and intravenously.

## RHEUMATISM

Rheumatism is a disease of the fibrous structures around the joints, affecting them successively, attended by fever, and acidity of the urine and perspiration. It is now believed to be infectious but not contagious, and to depend on some unknown microörganism. It is thought to be a disease of damp climates, yet it prevails to a remarkable extent in South



Africa, where the air is phenomenally dry. The constant blowing of the trade winds there, abstracting heat and moisture from the body, may account for this. Attacks are more common in fall and winter. Rheumatism is infrequent in childhood, becoming more common in early adult life, less so after the 40th year. Females are more liable up to the 15th year; males after this age. The prevalent belief in its heredity has been questioned, and it is now claimed that house infection accounts for the occurrence of several cases in a family. It occurs in drivers, sailors and others who are exposed to cold, damp winds. Such exposure often induces an acute attack. Each attack increases the liability to others.

The arguments in favor of the infectious nature of rheumatism are, its occurrence in epidemics followed by mild outbreaks, as occurs with other undoubtedly infectious diseases; the similarity of the symptoms and course to the latter; the presence of microorganisms in the blood during the attack, one of which injected into rabbits produced cardiac inflammations. This view is strengthened by the frequent concurrence of rheumatism with tonsillitis and other affections of the pharynx believed to be of microbic origin. Since his attention was directed to this point the writer has not seen a case of rheumatism which was not preceded by such a throat affection. It may be simply a redness, with some swelling of the glands, or a suppurative quinsy.

The older view attributed rheumatism to the production of lactic acid in the alimentary canal. The writer had an attack develop in a patient who was taking strontium lactate for diabetes. Richardson produced rheumatism by giving this acid and injecting it. This view may be harmonized with the preceding if we attribute the acid to the action of tmicrobes in the stomach or bowels.

Rheumatism has also been attributed to nervous derangement, either due to direct action of cold or to the disturbance of metabolism produced by it, one result of which may be the generation of lactic acid.

Affected joints show hyperemia of the fibrous structures and synovial membranes, the fluid turbid, albuminous and containing leucocytes. Pus is almost unknown. The disease is rarely fatal except through cardiac or pulmonary complications. The blood contains an excess of fibrin. In secondary inflammations the presence of pus shows complicating infections.

After the throat affection the acute attack sets in with a rigor, chilliness and fever; one of the joints also begins to ache, becomes tender and swells. Fever rises to  $102-4^{\circ}$ ; pulse above 100; tongue moist and white; anorexia, thirst; acid indigestion, urine and perspiration; urine scanty and sweating free; sudamina and milia plentiful; no mental involvement. As the inflammation appears in a new joint the last one attacked improves. The

large joints are most frequently attacked at first, but all in the body may be involved successively, even those of the vertebral column and the lower jaw. Most of the arthritic swelling is due to the extra-articular infiltration. Motion of the infected joints is impossible, the weight of the bed-clothes may be intolerable. In spite of the suffering, interference with digestion and free sweating, the prostration is remarkably moderate. The fever is irregular, rising when a new joint is involved, remitting or intermitting irregularly. It falls by lysis, except after profuse sweats. Leucocytosis is marked. Anemia soon supervenes. Albuminuria is common. The saliva may be acid and contain an excess of sulphocyanides. Murmurs may be heard in the heart during the pyrexia.

Rheumatism is more acute and painful in the young. Subacute forms are more frequent in older subjects, but there is as much danger of cardiac involvement as in the severe forms—some claim more.

The complications are hyperpyrexia, sometimes with delirium, more common in first attacks, fever reaching  $108^{\circ}$ , with the usual symptoms of this condition; pulse fast and weak, stupor, and rapid prostration.

Endocarditis is the most frequent of the cardiac complications, occurring in more than half Church's cases. It is less frequent as first attacks occur later in life, but each attack increases the liability to it. It is rarely ulcerative. It is most frequently the first step in the series of morbid processes forming the common "heart disease." Peri and myocarditis occur with the preceding or separately.

Pleurisy and pneumonia often attend the heart affections. Hyperemia of the lung, rapidly extending, may cause death in a short time.

Delirium generally depends on hyperpyrexia; it may be active or typhoid. It occurs also with pericarditis. It has been attributed to sodium salicylate. Coma is a dangerous symptom; especially if not due to hyperpyrexia. Convulsions may precede coma. Chorea is most frequent in cases occurring in early childhood. Meningitis is rare, except with ulcerative endocarditis. Polyneuritis sometimes occurs.

Several skin diseases have been described in connection with rheumatism, erythemas, urticaria, purpura, etc. Small nodules are found attached to the tendons and fascia, from a shot to a pea in size, especially about the hands and wrists. They remain for months, and are more common with children where they have diagnostic significance.

The course of rheumatism is variable. Death may occur suddenly from myocarditis, or from embolism. Impure salicylates in huge doses may cause death. Delirium and coma occurring in acute forms in the young, are ominous. But with modern methods, the dangers are mostly in heart sequels.



The diagnosis is not difficult if the definition of rheumatism is held in mind. Arthrites occurring with septic maladies rarely have acidity and the successive involvement of the joints. Suppuration also occurs with these forms, almost never in true rheumatism. Acute osteomyelitis near a joint may resemble it, but does not shift to other locations, and the septic symptoms soon develop. Acute arthritis of infants occurs earlier, remains at the hip affected, and suppurates. Gout first attacks small joints, the great toe notoriously, and tophi appear. Larger joints are only affected late in the history of the case; and the blood contains an excess of uric acid.

The man who diagnosis "everything that hurts" as rheumatism, including neuralgia, myalgia, gout, spinal irritation, septic arthrites and local affections, will have little success in his treatment.

Arrange the night-clothes so as to facilitate easy changing, as the sweats render frequent renewal desirable. Wool next the skin is thought to lessen the liability to cardiac disease. Sheets may be replaced by blankets. Frequent sponging with saturated solution of salicylic acid is grateful to the patient and useful—provided he is not moved, for every movement is agony.

Don't feed the patient on milk. Whether the disease depends on lactic acid or not, he will do better on other diet. Plain, strained vegetable or meat soups are useful, and suffice. Lemonade should be neutralized with soda, and given freely to make up for the great loss of fluid in sweating. Forbid alcohol absolutely, even if the patient has been long accustomed to a daily allowance. The beverage known as imperial is agreeable; made of potassium bitartrate and lemonade.

Apply over the joints flannels saturated with solutions of salicylic acid or salicylate of soda, cover thickly and change often. Carded cotton or wool is grateful to the patient with exquisitely tender joints. When the disease tends to linger in one joint after the fever has subsided, a blister over it will do good. A pillow under a sore knee will give comfort; and if it can be applied, a splint to hold the joint immovable will be beneficial and comfort-giving.

The more acute the attack, the more decided and prompt the relief afforded by salicylates. The usual method is to give soda salicylate, gr. 20, every two hours till the fever falls and the pain is assuaged. The relief afforded has few equals in practical medicine. But possibly these large doses are unnecessary. If rheumatism is due to fermentation in the stomach this will be prevented by very small quantities of salicylate, as long as it is present. It is proposed therefore to administer gr.  $\frac{1}{4}$  of salicylic acid, salicylate of quinine, or resorcin—or any other antiseptic—for all

the successful remedies for rheumatism are significantly local antiseptics. This minute dose is given every five to fifteen minutes, so that there shall at all times, every moment, be present in the stomach enough to inhibit the activity of the acid-forming microorganisms. This is especially valuable in subacute and chronic attacks, and in older patients, in whom the ordinary salicylate medication is less useful than in acute cases in the young. Salol, salicin, aspirin, and other derivatives of this group, each has its field of usefulness, some persons bearing one and not the others. It does not do for the doctor to become wedded to a single member of the group and forget the others.

Fuller's alkaline treatment has the credit of preventing heart-diseases better than any other. He advised the carbonates as better borne in maximal doses than the bicarbonates. Dissolve an ounce of soda or potash carbonate in two quarts of water or more, and let the patient use it as a drink, a glass every hour, so as to take the whole during 24 hours, if the urine is not sooner alkaline; as soon as it is, lessen the dose to just enough to keep it alkaline. By this time the force of the attack and acuteness of the suffering will be broken. Keep the urine alkaline till the patient is restored to health. There is no objection to adding lemon juice to the alkaline water; it is pleasanter and as effective.

When the malady lingers towards chronicity potassium iodide exerts a beneficent action it does not possess in earlier stages. An instance: A marine was transferred to the writer's care from his ship, with the special injunction not to give iodide, as it made him worse. With the curiosity of the man who touches fresh paint, the writer at once gave him iodide, and immediate improvement was the result. The dose is from 30 to 60 grains a day, well-diluted.

Cathartics are always useful. It has been said that the distress occasioned by their action exceeded the benefit; but the writer made special observations on this point and concluded that this was a mistake. Opiates are always harmful; temporary ease is followed by aggravation of the malady, and it tends under their influence to become chronic—the opium interfering with the natural evolution of the disease.

Hyperpyrexia calls for local applications of ice or cold water. In some cases cold has been applied to the joints to relieve pain, with benefit. But usually heat does better. The chronic "rheumatism" of the aged is rarely rheumatic. Myalgia, adhesions about the tendons and muscles, and other maladies, account for these cases, and for the uselessness of anti-rheumatic remedies. Massage with hot oil is useful in them and to remove the "dregs" of true rheumatism. Patients recovering from rheumatism must obey the rules of hygiene to escape subsequent attacks.



## SMALLPOX

When the Arabs invaded Spain in the seventh century, they brought with them the group of eruptive fevers. These were at first looked upon as a single affection, but in time smallpox was separated, and later the rest were distinguished. Scarcely anyone escapes the liability to smallpox, one of the most contagious of diseases. Very rarely, indeed, second and even third attacks have been reported. When pregnant women are attacked the child may be born with the disease or its scars, or may be free and escape through vaccination. Smallpox is especially fatal to the lower races of man.

The contagious principle is reproduced in the patient, and exists in the pus, excretions and exhalations from the skin and lungs. How early the contagium is active is unknown. It clings to infected rooms and clothing, and is carried by unaffected persons. How far it can be carried by the wind is uncertain. The writer has known the contagion to travel from a house on a street to one on an alley in the rear, a distance of over 200 feet. The virulence of an attack depends on the condition of the recipient's blood, the hygienic surroundings (sometimes but little), and the severity of the case from which it is derived. But before the discovery of vaccination, when it was thought that no one could escape this malady, persons were accustomed to visit friends who had light attacks, in the hope of contracting it in like degree.

Epidemics seem to gain with prevalence. For many years there had been but little smallpox in America, when shortly after the Spanish-American war numerous cases appeared over many states, so mild in character that it was not recognized. To this day many physicians persist in terming it Cuban itch, refusing to be convinced that it is atypic smallpox. But here and there it has developed under favoring conditions into the typic form with a mortality that gives one an awaking sense of what this disease was before vaccination had shorn it of its terrors.

The specific cause of smallpox is as yet not certainly known. Cope-land has obtained sporelike masses, cultivated them in collodion capsules, and with them produced typical vaccine pustules in the calf. The probable cause is the protozoan, *Cytoryctes variolæ*, discovered by Guarnieri in 1892 and studied by Councilman in 1903. This organism is found in the skin, where it goes through sexual and nonsexual cycles. In vaccination it occurs only in the nonsexual form and hence is not reproduced in the infectious form.

"A papule passing into the vesicular stage shows in the rete mucosum close to the true skin, an area in which the cells are smooth, granular,

and do not take the staining fluid. This represents a focus of coagulation necrosis, due according to Weigert, to the presence of micrococci. Around this area there is active inflammatory reaction, and in the vesicular stage the rete mucosum presents reticuli or spaces which contain serum, leucocytes and fibrin filaments. The umbilication corresponds to the area of primary necrosis. In the stage of maturation the reticuli become filled with leucocytes and many of the cells of the rete mucosum become vesicular. The papillæ of the true skin below the pustule are swollen and infiltrated with embryonic cells to a variable degree. If the suppuration extends into this layer scarring inevitably results; but if it is confined to the upper layer this does not necessarily follow. In the hemorrhagic cases red corpuscles pass out in large numbers from the vessels and occupy the vesicular spaces. They infiltrate also the deeper layers of the epidermis in the skin adjacent to the papules" (Osler).

Pustules may appear in the mouth, pharynx, esophagus and even in the stomach. Peyer's patches may be swollen, and pustules have been seen in the rectum. They may be accompanied in the larynx by edema, croupous membrane, or necrosis of the cartilages. Pulmonary inflammations are common. The liver may show diffuse hepatitis, fatty degeneration or small necroses. The red-blood cells clump, and leucocytosis is active. Cardiac inflammations and degenerations may be present; the spleen enlarges, the kidneys may show cloudy swelling and necrosed areas, nephritis is not unknown during convalescence; and orchitis is frequent.

In the hemorrhagic form there are extravasations under the serous and mucous membranes and in the parenchyma of organs, the marrow, nerve sheaths, connective tissues, muscles, meninges, etc.

**Symptoms:**—Three forms are described, the ordinary, hemorrhagic and modified or varioloid. Welch says that the incubation is twelve days, almost to the hour.

The attack begins abruptly with a chill, or a convulsion in children. Headache and vomiting are severe, but the peculiar symptom is the intense aching in the lumbar region. Pains are also felt in the calves. The fever rises to 103° F. or more on the first day; the pulse fast and full. Delirium attends high fever. The patient is unusually restless, the face red, eyes bright, skin dry with a pungent heat, sweating being an occasional feature. Petechiæ may appear, also rashes resembling measles and scarlatina. These are usually on the lower abdomen, inner thighs, under the arms and on the thorax adjoining.

The eruption, if discrete, appears pretty accurately forty-eight hours after the initial chill; on the forehead and wrists, as small red papules feeling like shot under the skin. They follow on the face, extremities,



and a few on the trunk. Relief follows the eruption, and the fever falls. By the fifth day the papules have become vesicles, with a central depression or umbilication; by the eighth they have become pustules, the depression disappearing. As the pus appears the fever returns, and a red areola forms around each pock, with some swelling. Pain, tenderness and tension follow, and the eyelids may close. Leucocytosis is now marked. By the tenth or eleventh day the fever has begun to fall, the pustules to dry, and convalescence begins. Pitting from discrete smallpox is slight, unless itching induces the patient to scratch the pustules open. The chronology of the disease may be thus stated:

First day:—Attack; chill or convulsion; primary fever.

Third day:—Eruption; papule; remission.

Fifth day:—Vesicle; umbilicated.

Eighth day:—Pustule; secondary fever.

Tenth day:—Defervescence.

In the confluent form the eruption comes out a little earlier than in the discrete, the papules appearing early on the third day. In severe cases they are confluent from the first, but in the semi-confluent they coalesce in the pustular stage. In all forms there is less of the eruption on the trunk, where the papules are generally discrete. The remission of fever is not so pronounced as in the discrete form. As the eruption becomes pustular fever returns, and the areolæ about the pocks coalescing, we have continuous suppuration of the skin, with pain, tenderness and swelling. The temperature usually reaches 104° F., pulse 120; delirium is frequent and may be active. Patients occasionally escape from their nurses and create panic by appearing in public. The eruption in the mouth causes salivation; that in the larynx may endanger life by suffocation. Diarrhea is more common in the young. Thirst is distressing. The lymphatic glands swell, especially in the neck. The eyes are closed and sight may be destroyed. The strength ebbs rapidly, and the typhoid state develops. The odor is dreadful; and with absorption of toxins from the skin causes the highest grade of toxemia. If the case is grave the pulse fails, delirium increases, diarrhea sets in, with subsultus and other evidences of an overwhelmed nervous system; or hemorrhages carry off the patient. From the eighth to the eleventh days is the period of danger.

If the patient survives till the twelfth day the pustules begin to dry, the fever to subside, but toxemia continues. The pocks usually rupture, and with the access of air come microorganisms, which increase the ulceration by which scabs are separated from the skin. Sometimes they coalesce and come off in casts of the hands and face.

A subvariety of the confluent form is known as corymbose. In it the eruption appears in groups, which are confluent, with patches of unaffected skin intervening. This is a specially dangerous form, the mortality being about 50 per cent.

The term black smallpox is given to a hemorrhagic form in which the pocks contain blood from the first. Indeed, the patient may die before the eruption appears, overwhelmed by the force of the attack. In one such case coming under the writer's notice the patient died on the second day and the eruption appeared after death. This form is more common in some epidemics than in others. It may be expected when the disease prevails in crowded tenements, with bad hygienic conditions, and especially in persons whose blood is vitiated by alcoholic indulgence and dissipation. But Osler says young and vigorous persons seem more liable to this form. This has not been the writer's experience, whose most typical case was a middle-aged, whisky-saturated prostitute.

In the hemorrhagic form the malady begins with marked severity. On the second day an erythema appears, with blood points, often in the groins. This spreads, the points enlarging; ecchymoses appear in the eyes and on the mucosa. The skin may become almost universally purplish. Delirium is absent. Death is usual before the end of the week. Hematuria, hematemesis, hemoptysis and melena may occur. Women bleed from the genitals. The pulse is very rapid, the respiration fast and shallow.

In another form the eruption appears as an ordinary one but becomes hemorrhagic in the vesicular or the pustular stage. These are grave but less so than those in which blood appears earlier. Mucous hemorrhages are more frequent. Still, most of these die before the tenth day.

In another group, the pocks become bloody in the vesicular stage, and abort quickly with speedy recovery.

When persons who have been vaccinated contract smallpox it appears in a modified form known as varioloid. The attack may be as violent as the unmodified variety, with high fever, head and back ache, though usually it is much milder. The papules are few, the fever subsides as they appear, and the vesicles form little or no pus, so that secondary fever does not appear. Scarring is slight. Sometimes the vesicles dry into horny or warty masses without pus formation.

It is claimed that there may even be varioloid without any eruption; cases during an epidemic occurring in persons exposed, who are seized with fever, back and headache, but recover in a few days.

The complications of smallpox are few—it is enough in itself! They comprise laryngeal maladies, bronchitis, catarrhal or lobar pneumonia,



pleurisy, cardiac inflammations, parotitis, pseudodiphtheritic angina, and vomiting and diarrhea in children. Albuminuria is common, nephritis rare. Convulsions in children may end in fatal coma. Rare sequels are insanity, epilepsy, neuritis, myelitis, paralyses, ataxia, and various affections of the skin, such as acne, ecthyma and boils. Necrosis and arthritis occur. An apparent relapse has been described. Conjunctivitis is frequent and loss of one or both eyes was formerly common. Iritis and otitis media are less frequent.

Scrofula was formerly very frequent after variola; and the writer has seen the worst cases coming thus; with abscesses, suppuration of lymphatic glands and of bone, ending fatally after years of suffering.

When Sydenham overthrew the method of treatment based on the idea of bringing out the eruption by heat, he reduced the mortality from something like 90 per cent to one-half of this. Black smallpox is always fatal; the corymbose kills 50 per cent; the confluent is especially fatal to the young; the dissipated and drunkards die; pregnant women nearly always die aborting. Hyperpyrexia and grave nervous implications are ominous. The degree of confluence on the face is a fair indication of the danger. Necrosis of the laryngeal cartilages is usually fatal. Pulmonary complications kill the children.

Death occurs very early when the system is overwhelmed by the attack, as in hemorrhagic cases; otherwise the twelfth day is the most dangerous to life.

The diagnosis is made by the chill or convulsion—the latter being especially significant in unprotected children who have been exposed. Headache and vomiting are generally present, but less diagnostic than the severity of the backache, which is the main evidence preceding the eruption. This, occurring on the third or fourth day, on the forehead at the roots of the hair and on the wrists, its shotty feel, indicate smallpox. The preliminary rashes may resemble scarlatina or measles so closely that a diagnosis is impossible until the true eruption appears. The writer has mistaken a syphilitic eruption of papules in a negro for smallpox, during its prevalence in the neighborhood. Chicken-pox may be distinguished by the eruption occurring in crops, the pocks being of different sizes and shapes, and the history of exposure; but this takes time. The eruption of the little disease is most profuse on the trunk, it is not shotty and vesicles form quicker.

Hemorrhagic forms may closely simulate cerebrospinal fever in children. Constitutional syphilis sometimes appears with fever accompanying a widespread eruption of papules, becoming pustular. Pustular glanders has been mistaken for smallpox. Impetigo contagiosa may

resemble the variolous eruption, but the absence of fever, the different course of the malady, and the easily traced contagion, serve to differentiate. But in any of the above the physician may have to wait some days to complete his diagnosis.

**Treatment:**—The patient should be immediately removed to the hospital for contagious diseases. It is impossible to prevent the spread of the malady otherwise, unless every possibly exposed person is properly vaccinated—and only those who have tried it know how difficult this is. For example: A prostitute died of what was afterwards determined to be hemorrhagic smallpox, but was certified as alcoholism at the time. A young man, a visitor of the woman, living a mile away, was seized with smallpox. All at his home were vaccinated, and all in the next two houses; but an unvaccinated babe in the third house was seized with the disease. Three families next were vaccinated, but in the fourth resided an anti-vaccinator, and he lost his wife and all his children. On the street next to that containing the house first affected, directly behind it, was an unvaccinated child, which was also taken. The grandfather of one of the unvaccinated patients visited it, and carried the infection to another grandchild residing several miles away. In all, twenty-two cases came from the woman who died.

The patient should be isolated in the sick-room, and the regime instituted as described in the chapter on typhoid fever. The room must be kept cool, the patient not loaded with blankets, as the illiterate nurse will assuredly do, to "bring the rash out." Isolation must be absolute, also the disinfection of dishes, linen, and all other objects used by the patient, before they leave the sick-room. The nurse must have a suitable cover for her clothes, which can be taken off before she leaves the room. All unprotected persons must be sent out of the house. Strict quarantine should be maintained.

For the good of the patient, ventilation must be of the freest, although this adds to the danger of transmitting contagion.

Welch says that vaccinia does not exert its prophylactic power until the red areola appears around the point of insertion of the virus. When a person has contracted smallpox, if vaccinated so early that this areola appears before the smallpox has shown any symptoms, the attack may be entirely prevented. If not, but the areola appears before the smallpox eruption come out, the attack may be mitigated in severity. The areola appears on the seventh or eighth day after vaccination; the outbreak of smallpox occurs on the tenth day after infection. Vaccination performed within three days after smallpox infection may therefore prevent the attack of the latter, or if done within three days more may favorably modify the



disease. Every day after the infection has occurred, that elapses before vaccination is done, lessens its modifying influence. The degree of protection thus afforded varies in different individuals. Revaccination takes effect quicker and is more effective than primary vaccination. Human virus takes effect quicker than bovine; and Welch prefers eight-day lymph. Waterhouse believed that multiple insertions hastened the vaccination. To ensure success Welch advises the use of several lymphs and revaccination daily until success is evident. Forty-seven persons vaccinated by him for the first time, after exposure at the smallpox hospital, were perfectly protected against the disease.

The usual toilet of the bowels, and remedies for fever, are indicated.

The weight of evidence favors the claim that saturation with calcium sulphide inhibits the action of the protozoan. If this is quickly accomplished (by administering a grain of the salt every half to one hour till the perspiration exhales the odor of sulphydric acid, then enough to sustain this effect), the subsequent course is modified, secondary fever does not arise, as the suppuration on which it depends is checked, and abortive forms appear. The remedy is harmless in any event; but if it is given during vaccination it prevents the development of the latter as well.

Tepid baths are useful when the case is not too severe to be handled, and zinc sulphocarbolate may be added to the water, gr. x to Oj, being especially suitable as antiseptic and non-toxic. The temperature of the bath should be about 105° F. to begin with, gradually cooled by adding cold water until the patient's temperature has been reduced as desirable.

It is not likely that there will be any irritability of the stomach if the bowels have been emptied and renal elimination is kept up. If there is, it may be allayed by sips of carbonated water, small pellets of ice, or by cocaine, gr. 1-6, repeated hourly. Cool, wet compresses to the face are grateful. Headache means toxemia; it calls for eliminants. Insomnia and delirium are controlled best by hyoscine hydrobromate, gr. 1-100, hypodermically; or nickel bromide, or camphor monobromide, the latter in depressed cases. Either should be given to effect—gr. 1-6 to j every half-hour. Caffeine valerianate, gr. 1-6 half-hourly, meets the indication admirably in many cases of depressed irritability.

Convulsions indicate hyperpyrexia or deficient elimination; the remedies being cold to the head and entire body, or pilocarpine hypodermics, or veratrine enough to subdue vascular tension, or saline solution, 1-2 pint, thrown into the colon to flush the kidneys. These remedies will usually relieve the lumbar pain; or macrotin may be given, a grain every hour. Welch condemns rubefacients strongly as increasing the eruption and the danger. No derivation is thus secured.

The diet during the first stage should consist of bland fluids alone—milk, clear broth, albumen water, fruit juices, lemonade, effervescent saline laxative, may be employed as beverages throughout. If depression is marked, raw beef fluids such as bovine and sanguiferrin may be administered in small and frequent doses.

The above treatment should be continued during the eruptive stage. Depression may render it advisable to employ warm baths, if the extremities are cool, especially with children. Hot broths and teas containing a little capsicum are also then advisable, and it must be recollected that in children convulsions have a different meaning from those of adults. Dangerous depression of vitality must be foreseen and quickly remedied. Implication of the throat may render concentrated or strongly tasting medicines unbearable; the mouth and throat, as well as the nasal passages, should be frequently cleansed with some mild antiseptic solution. Welch recommends flaxseed lemonade. Mild cocaine sprays may be required to enable the patient to swallow food. Pellets of ice dissolved in the mouth are also grateful. Menthol tablets used as lozenges are relished by many. There will be less glandular swelling in the neck, the better the cleansing of the mouth and throat is done; if annoying, it may require cold compresses or ice-bags. These must not be too steadily applied. Hot applications are preferred by many patients, and are equally good. Dilute chlorine water is a useful lotion for fetor. Edema of the glottis may necessitate intubation or even tracheotomy.

With suppurative fever insomnia and delirium may appear, especially if the bowels have not been kept clear and disinfected, and renal elimination maintained. We must ask our readers' pardon for so frequently repeating these words—but in truth it is necessary to do so that their vital importance may not be forgotten. To the hyoscine it may be necessary to add cicutine hydrobromate, or gelseminine also, if the delirium be fierce. Give enough to control the symptoms. Cicutine, gr. 1-67, with gr. 1-250 of each of the others, every hour till effect, is possibly an average dose. But if the pulse be strong or the kidneys fail, veratrine is needed—to effect. The patient must be carefully watched in this stage, as he may get away and do irreparable harm to himself or to others.

In hemorrhagic forms Welch has little expectation of benefit from acids, quinine, ergot, or iron. Indicating profound toxemia or an attack by the protozoa on the red blood cells, remedies for sustaining the vital forces are indicated. Strychnine arsenate and uncin in fullest doses are our chief reliance, giving the former as far as the pulse indicates as proper, and the latter up to a dram a day of the standard solution. Echinacea should be useful if the claims of its advocates are well-founded—it is at



least harmless and may be given on the possibility of benefit. Cocaine has proved valuable in purpura hemorrhagica and may be tried here. The old hemostatics have all been fully tried and found useless.

Welch has little to say in favor of the bath treatment of smallpox—it is difficult in the suppurative stages and not efficient. Cold compresses and sponging are useful. The continuous bath offers some advantages; the patient's temperature may thus be sustained at any desired point, and the water being impregnated with antiseptics may oppose the infective processes in the skin. One young man was kept in the bath for five days, the temperature remaining at 100° F.; but on removing him it rose to 103° F. and he died of systemic poisoning that had not been prevented by the immersion. This well illustrates the limitations of the bath system—in all maladies—it combats a symptom, but the disease goes on.

Vital depression is indicated by pallor and shrinking of the face and hands, rapid, feeble pulse, tremors, subsultus tendinum, dry tongue, delirium, and worst of all by dilating pupils. The enormous loss by free suppuration fully accounts for this condition. The wise physician will fortify his patient against it by careful nutrition during the early stages, the free use of nuclein and cardiac tonics as soon as their indication is presented, and by the use of the sulphide of lime to restrain the destruction of tissue. Throughout the disease food should be administered in small quantities at intervals of four hours, with a small cup of coffee between each two doses. We do not believe in the value of alcohol or use it in any form or case of this malady; Welch's great authority to the contrary. Whenever it is possible no drugs should be given by the stomach that could possibly irritate it; the hypodermic method will render this unnecessary in most instances, and nuclein may be dropped on the tongue and absorbed from the mouth. The rectum is a poor way to introduce food or medicine, but the vagina absorbs much better. Wool tampons introduced in it will convey a good deal of bovine into the system.

As a rule the swollen eyes are best treated by cold compresses, though leeches may rarely be advisable. Hot compresses are often preferred. As soon as possible boric lotions should be applied, frequently. Hemorrhage from the nostrils may be checked by chromic acid solutions, as in diphtheria. Ointments applied to the lids prevent adhesion. For conjunctivitis silver solutions are advisable.

The same treatment should be continued during the stage of decline, tonics gradually replacing antipyretics. Quinine hydroferrocyanate, gr. 1-6, every two hours, is a valuable remedy, combating sepsis and restoring the crisis of the blood. The diet list may be carefully enlarged by the addition of mild farinacea, toast, custards, eggs and junket—the latter



is useful throughout. Diarrhea may require a few doses of zinc or calcium sulphocarbolate—enough to control it. If obstinate, add cotoin or silver oxide, *quantum sufficit*. Edema of dependent parts calls for tincture of chloride of iron, or for berberine and calcium lactophosphate—the one to restore connective tissue tone, the other to rebuild the fragile cell walls.

The importance of these remedies is too great to be overlooked. Much future trouble is avoided by their judicious application. Iron cannot be “rushed” now; quinine destroys protoplasm, and it cannot be spared; strychnine has been employed during the crisis and may now be replaced by brucine. It seems probably that bebeerine, standing between quinine and berberine, might be applicable here.

There is a vast rush of debris to the eliminant organs, and these must not become clogged. The vegetable, non-debilitating stimulants of the lymphatic system, stillingin and phytolaccin, should prove of value. Attention to this will aid in preventing abscesses and other disagreeable sequels.

While Finsen strongly advocated the red light treatment of smallpox, Brayton observed no benefit in 300 cases so treated. Serums have failed.

To allay itching apply linseed oil and lime water, weak phenol or thymol ointments in petrolatum, or cold compresses. Hot compresses are more agreeable in some cases. Discharging pus should be removed by any mild antiseptic lotion, and dusting powders applied to allay fetor.

Many devices have been advocated to prevent pitting. Welch has had the fullest opportunities of trying these and he doubts if anything accomplishes this object. Possibly painting with pure tincture of iodine may be an exception; he thinks it shrinks the pustules, hastens decrustation and lessens pitting, diminishing the liability to subsequent suppuration and completely destroying the odor from that portion of the skin to which the iodine is applied. Sodium bicarbonate with petrolatum softens the scabs, and antiseptic baths aid in their removal.

The conjunctiva may require snipping, or canthotomy be needed, to relieve pressure on the eye or facilitate examination and treatment. Ulceration of the cornea requires the service of a specialist, or the special knowledge to be obtained from works on that specialty.

## VACCINATION

Jenner began to vaccinate in 1796, having discovered the popular belief in the efficacy of cowpox some years previously. The discovery was received with the most virulent and determined opposition. Its innate absurdity appealed to the numerous class who measure every new idea by presumption of the completeness of their preëxisting knowledge.

As there was not a solitary fact then known with which the idea of vaccination could be assimilated, it must be wrong. The venomous animosity with which Waterhouse was persecuted for bringing vaccination to America, must ever be a consolation and support for those who meet similar abuse for endeavoring to enlighten the medical profession. The Bible was of course levied upon for material, and the highly lucid argument adduced, that the "mark of the Beast" in Revelation meant vaccination! To this day the opposition persists, and Antivaccination Societies exist, as monuments of human wrongheadedness and incapacity for impartial, logical, truthful reasoning.

What is vaccinia? Several experimentors vaccinated calves with smallpox, and produced typical vaccine virus. Others did the same thing, but the virus produced caused genuine smallpox. There is a lapsus here in our knowledge. The view now held is that vaccinia is smallpox modified by transmission through the body of the inferior animal, only the non-sexual forms of the parasite being present.

When the vaccine virus has been introduced there is a little irritation caused by the scratching, which subsides in a short time. Much irritation or suppuration is an evidence of contamination of the virus with pathogenic microorganisms; and if the irritation has subsided at the end of a week, this is to be considered a false vaccination, and the operation should be done over. If successful, there is no irritation until the third to the sixth day; if the virus is weak, not till the eighth day. Then a small red papule appears, like a shot under the skin. By the eighth or ninth day a red areola has developed around it, and the papule has become a pearly vesicle—the 'pearl upon a roseleaf.' The vesicle may be from a line to half an inch in diameter, or much larger if a large surface has been denuded of epithelium and plenty of virus applied, so as to form a number of coalescing vesicles. The vesicle is umbilicated, and resembles closely a true smallpox vesicle. The areola may be three inches in diameter. The glands in the axilla are tender and swollen—if the vaccination has been done on the arm—and there is fever rising to 100 or 104° F. This lasts one or more days, and as the vesicle dries the fever subsides. The vesicle becomes a pustule, loses its umbilication, and if irritated often breaks and its contents are exuded. They may erode the skin, or be transferred by scratching to any part of the patient's body within reach, even to the eyes, where they may do great harm.

In one of the writer's cases an unruly child transferred the virus, which had just been applied to his arm, to his eyes, where it took effect. The result was a permanent opacity, for which the vaccinator was blamed.



The local inflammation may be great, the arm stiff and painful, and the hand held several inches from it feels heat radiating from it. There is decided leucocytosis. The pustule dries into a scab, which may be loosened and removed about the 15th day, or may adhere a week more. There is left a scar which becomes white in time, with depressions like the mark made by pressing a thimble against the skin. If the scab has been loosened by ulceration the scar may be radiating with no thimble-pitting. As the scab forms there is much itching, but not so much as with spurious vaccinations. The latter appear earlier and are well on to recovery at the end of a week from the vaccination.

Children who are eczematous but have not yet shown the eruption, will have an outbreak when the constitutional symptoms are present. For instance in a family where all the children had eczema when the first teeth were cut, the writer vaccinated a baby before it had any teeth; and the family eczema appeared. A popular but homely way of expressing this is, that "whatever is in the child will come out with the vaccination." Erythema or erysipelas may occur, if asepsis is not secured. A physician on a hot July day vaccinated 20 persons, first rubbing up a scab on a glass plate and adding a drop of water for each operation. On the next day he vaccinated 20 more, with what was left of the same virus. Every person vaccinated on the second day had erysipelas. Want of proper precaution may result in contamination of the virus with tetanus, impetigo contagiosa, syphilis, varicella, or tuberculosis. Or, the virus being pure, any of these may enter the sore if opened and contaminated. Urticaria, lichen, and other non-contagious maladies may be aroused by the operation. The glands may go on to suppuration if pyogenic germs enter. There is no reason to doubt that scarlatina and measles may be transmitted by vaccination, though the writer has never known of a case. Here is an instance of the manner in which popular prejudice against vaccination arises: He vaccinated 25 children in a public school. Next day one of them was taken with scarlatina, and the case was reported as due to vaccination. But the record showed that the virus had been taken from a child who was free from scarlatina; 24 others vaccinated from the same virus were found free from scarlatina; the period of incubation was too short; and finally it was shown that the child who sat in the seat next to the patient had been at home with scarlatina, and was almost certainly the source of infection. And yet that case was heralded by the antivaccinators as an instance of bad vaccination.

Occasionally pneumonia has developed during the febrile period. Whether there was any connection between this and the vaccination is



uncertain. As this occurred five times after over 10,000 vaccinations, it is a question if that many pneumonias would not have occurred without the operation in that length of time—a month. If they were due to an accidental infection with the pneumococcus this is an addition to our knowledge, as we know of no successful inoculations with this organism. The writer looks on the association as accidental.

Fainting sometimes occurs from the operation. The writer looked upon this as nervous until chance led him to the true cause. The vaccine scab taken from the arm of a child is composed of two parts, separated by a partition; the part outside containing the vaccine lymph, that next the arm being simply dried pus. Not knowing this, he used under the surface of a crust for vaccinating, and several patients fainted during the operation, in succession. He then employed the outer part of the same crust, and not one fainted. This observation was verified by subsequent trials. The pus that caused fainting also caused several suppurations of axillary glands, and did not produce true vaccinations.

What, then, are the objections to vaccination? Before replying to this question, the writer desires to state how he comes to have the right to reply to it. For five years he held a vaccine district in an eastern city. During this period he visited every house in the district from two to four times a year, and when a case of smallpox occurred he again visited every house within a block. In this time he vaccinated over 10,000 of the people and influenced nearly all the rest to be vaccinated when they needed it. Every case of smallpox was reported to him; every one vaccinated was seen by him a week after the operation and again a week later. In this way every case of supposed harm from vaccination was brought to his attention, and he had every opportunity to judge of the effects, immediate and remote, and of the degree to which immunity against smallpox was conferred by it.

But two cases occurred in which injury of more than transient and unimportant character ensued. In one, a girl vaccinated with bovine virus was inoculated with tubercle, from which she died a year later. The house supplying this virus went out of the business on account of the investigation following. The other was a spoiled child who resisted vaccination, wiped the virus from his arm and at once transferred it to his eye. The vaccination "took" on the cornea, leaving an opacity. The sight was impaired slightly.

On the other hand, there were some curious instances in which the vaccination was actually followed by improvement of health. In one case, a boy of eight years had been so puny that he had never been sent to school. When the vaccination took, an erythema broke out over his body, and a complete change took place, so that when the writer saw him a year afterward the mother proudly boasted that the boy "thrashed every other

child in the block." Many children were brought by their mothers, Germans mostly, to be vaccinated to cure whooping-cough. The results were sufficiently satisfactory to make the practice customary.

The writer has never seen a case of syphilis due to vaccination, though many supposed cases have been referred to him as an expert. That such cases have occurred is established, but every one so referred to him turned out to be some harmless skin affection, for the most part non-transmissible like eczema. If there is a tendency to scrofula in a child, it will be aroused by vaccination; since variola was a great cause of scrofula. In such cases it is wise to postpone vaccination until the health is well established, unless there is immediate danger of smallpox infection, when the lesser of two dangers is to be chosen.

What of the immunity conferred by vaccination? At first Jenner proclaimed absolute and eternal immunity; but before he died he advised revaccination every year. Human beings differ in this as in most respects. With some a single vaccination seems to forever exhaust the susceptibility; with others immunity expires in a longer or shorter time. Some persons once vaccinated will never take again; while others will take well in a year. The only way to tell if the old vaccination is yet protective is to revaccinate whenever there is danger of smallpox. If a revaccination will not take, much less will smallpox, for the writer has produced good vaccinations on persons who had had smallpox. Surgeon E. D. Payne, U. S. Navy, employed immediate revaccination, as soon as the preceding had healed. This was repeated until there was no longer any reaction; and such persons proved immune when exposed to smallpox. This we believe to be the best method, as in this way we may be sure that there is no longer any liability unexhausted.

Lymph from the calf is now employed universally in preference to that from the child. There is no danger of syphilis in calf lymph, and but little of tubercle. In the case mentioned, there seemed to be an infection of the premises where the lymph was taken and stored. After the points had been charged with lymph they were placed in a drying box, but after 48 hours it was found that the lymph had not dried. This liquefaction of the lymph recalled an observation of Reynolds that tubercular sputa ejected into a handkerchief did not dry but remained wet, while non-tubercular sputa soon dried.

The Chicago Health Department tests its virus bacteriologically for purity and freedom from pathogenic germs, and again tests for potency. The result is a sure and safe virus—the only sort fit for use. Were such precautions taken with all virus used, there would be fewer antivaccinators to prevent perfect protection of the community and eradication of smallpox.



In vaccinating, the only advantage in selecting the arm, near but not directly over the insertion of the deltoid, is that as we always look there to see if one has been vaccinated, it simplifies this examination. Wash the skin with soap and water, then with alcohol, and then with a sterile instrument scarify or scrape so as to uncover the secreting surface of the true skin; then apply the virus, and cover to exclude tetanus and other malefic germs. If the blood is drawn it hinders absorption and frightens the child. It is not necessary to cause pain. Let the surface dry before replacing the clothing, or the virus may be rubbed off. When the inflammation is present no dressing equals cool compresses, changed as desired. A few granules of aconitine, with a saline laxative, are all the medication required.

Perfect vaccination is a perfect protection against smallpox.

Revaccinate whenever there is smallpox in the neighborhood.

Do not try to argue with an antivaccinator. He is beyond the reach of reason, and incapable of telling the truth.

## VARICELLA

There is no connection between varicella and variola except that the former occasionally confuses the diagnosis of mild cases of the latter. Chicken-pox occurs from contagion, and in most cases this may be traced. It is most common in childhood.

The incubation lasts 10 to 15 days, with no symptoms. The attack commences with a chill, fever, vomiting, or aching in the back or legs. The eruption appears within 24 hours, on the back or chest, sometimes on the face. It appears as papules, changing in a few hours to vesicles, containing a clear fluid soon becoming turbid. The vesicles are of various size and shape, not uniform as with smallpox; some but not all are umbilicated; they are rather oval than round; there is little or no inflammatory areola surrounding them; they become purulent within two days, and then dry up, falling off before the fifth day as brown scabs, leaving no scar unless scratched open. Fresh crops appear, so that some are papules while others are vesicles, pustules and scabs. They are never confluent. They vary from a few to hundreds. Sometimes a scarlatiniform rash precedes the true eruption. They may come on the mouth and laryngeal mucosa. Sometimes the eruption comes in large bullæ. The fever is slight. In strumous children gangrene of the skin or scrotum has occurred. Hemorrhagic cases have been recorded, with mucous hemorrhages and cutaneous ecchymoses. Nephritis and paralysis are rare sequels. Death has resulted from the general eruption. The writer lost a child from meningitis suddenly



developing during an attack of varicella. Second and even third attacks have occurred, though as a rule it is self-protective.

The diagnosis is easy, from the description given. The multiform eruption always distinguishes it from smallpox even when no history is attainable.

**Treatment:**—Empty the bowels with calomel, gr. 1-6, followed by saline laxative; then follow with aconitine for fever, and phenol lotions to allay itching and prevent scratching. Give plenty of water, see that elimination is free, ventilate well, and feed with mild, non-irritant fluids.

## SCARLATINA

Sydenham contemptuously termed this the "name of a disease." We are far from looking upon it in such a light, for scarlet fever shares with diphtheria the dread of parent and physician as among the most dangerous and treacherous of diseases. Since vaccination has put an end to the huge mortality of smallpox, there are many more subjects left for scarlatina, and the deaths from it have greatly increased. It is one of the most contagious of diseases. Children are affected mostly, but all ages are liable; one of our Admirals having been seized with it some years ago, scattering the officers' families in terror from the naval rendezvous at Port Royal. Cases occur at all seasons, in both sexes alike, but some persons appear to be immune.

The contagion is carried on clothing. A lady visited her niece, ill with scarlatina; the sick child climbed into her lap; on returning to her home her own child did the same thing, and contracted a fatal attack.

A child recovered from this malady, and the family being anxious to avoid it in their other children, who had been sent out of the house, employed an expert to supervise the disinfection and fumigation, which were done regardless of cost. The children came home, and promptly went down with the disease. Reviewing the means employed to ascertain where the failure had come in, the expert noticed that the mother had very heavy hair. Inquiry showed that she had not disinfected it; and as she had nursed the first sick child, the source of contagion was evident.

The contagion lasts long. A man died of scarlatina in a mountain hamlet in Pennsylvania. His clothes were placed in a trunk in the garret. Twenty-five years afterwards his daughter got them down and cut from them a suit for her son; who in due time took down with scarlatina. At the time there was no case in the neighborhood, nor had there been any communication with any place where it prevailed.

The contagion probably is present from the first, even during the incubation. It exists in the first desquamation, but if successive coats

are thrown off, only the first carries it. It is also carried in milk. It is generally self-protective, but second attacks have been reported. Surgical and puerperal scarlatinas are probably septicemias.

No specific lesions are found after death; the anatomy of scarlatina is exclusively living anatomy. The throat may show ulceration or membranous deposits, the cervical glands may be enlarged or suppurative; the pharynx, stomach and intestines may be catarrhal; the liver show interstitial degeneration, the spleen enlarged, cardiac inflammations may occur, and there is often nephritis. Catarrhal pneumonia is a common complication.

The incubation varies from a day to a week. The invasion is abrupt, with irritation of the stomach or convulsions; fever rising quickly to  $105^{\circ}$  or to a much higher point in a few hours. The skin is dry and radiates pungent heat. The tongue is coated, the mouth dry; cough is usual, the face flushed and the child incessantly calls for water.

The eruption comes out on the next day, as a general flush with deep red pin-points, on the neck and chest, spreading over the whole body within a few hours. After two to three days it begins to fade. The skin seems of a uniform scarlet but close examination shows it to be mottled. It is swollen also. Press the finger firmly on it, and the white spot is almost immediately rosy when the pressure is removed. Hemorrhagic points, sudamina and milia may appear. The eruption occurs also on the soft palate. Large petechiæ form in malignant cases. The child complains of burning and itching. The entire skin may not be affected, and there is even a form with no eruption. The tongue is red at the tip and edges, small, pointed, the enlarged papillæ projecting like the seeds of a strawberry. The fur peels off leaving the whole tongue red. The breath has a heavy-sweet odor.

The soft palate, tonsils and pharynx are early in the disease red and punctate. In some cases the tissues are swollen, and in others the angina simulates diphtheria. In these about the seventh or eighth day the breath becomes offensive, and the tonsils are found to be covered with a pultaceous deposit, resembling the false membrane of diphtheria. Like the latter the local disease may spread forward into the mouth, up into the nose, out into the antrum, the malar bones, the nasal ducts to the eyes, the eustachian tubes to the ears, rarely into the pharynx and very rarely the esophagus and stomach. The parotids and cervical lymphatic glands are affected, and apt to suppurate. The whole of this vast region may be affected as in diphtheria, the tissues necrosing and all pouring out quantities of corrosive matter, whose stench is so great that strong men faint when brought into the sick-room. The ear-drums may be perforated and hearing destroyed, the malar bones necrose and be cast off whole, the corners of the mouth



ulcerate, and epistaxis may set in and carry off the patient. In one case, an infant a year old, the writer found fluctuation in the region of a parotid. This was in 1876. Diligent search of the text-books of the day elicited the advice to let the collection alone; and the whole skin from the right ear to near the left one, and the ramus of the jaw to the clavicle, sloughed off, with the connective tissue. The little muscles of the neck could be lifted up on a probe as easily as if dissected out—as in truth they were. The carotid was seen pulsating, the sheath gone. The family lived in the garret of a tenement; and just then the mother presented the whisky-saturated father with another babe. One-tenth the disease would have killed a millionaire's child, but naturally under the circumstances this one recovered; and it was one of the great surprises of the physician to see the rapidity with which the tissues were regenerated and the huge gap filled in. But never again did he allow such an abscess to go an hour without opening it.

The fever is very high; in but one other malady can it go so high and recovery ensue. It is not unusual to see it reach  $104^{\circ}$  the first day, and the writer has recorded  $112^{\circ}$  in one case. The pulse is also high, reaching 140 in many cases that recover. Respiration is also rapid. The fever rises when the rash comes out. The nervous symptoms are few and limited to headache and delirium from fever, unless the toxemia of angina causes hebétude. The digestive system is usually in fairly good shape. The urine is red and scanty, showing albumin early, with hyaline casts.

When the rash has been out for three days it begins to fade and the skin feels rough. Desquamation comes on, the skin shedding its epithelium in scales or flakes, that of the hands sometimes coming off entire. The hair and nails may be shed. Desquamation is completed within three weeks from the onset of the attack, but it may be repeated several times.

Leucocytosis is present. Sometimes when one child in a family has scarlatina others in the household may be slightly ill for a few days, with sore-throat and slight fever, possibly no perceptible rash, and yet be thenceforth immune against this malady.

On the other hand in some cases the poison is so intense that the patient's vitality is overwhelmed by the attack, and death supervenes in a few hours. One of the writer's patients was seized with a convulsion at 11 a. m., and died at 3 p. m. the same day, having never regained consciousness.

Sometimes the blood is disorganized by the toxins, and petechiæ appear and enlarge, hemorrhages occur from the mucous membranes, and death comes on the second or third day.

The most important sequel is acute nephritis; occurring during convalescence. The albuminuria does not cease but increases, during defervescence and desquamation, or it develops then first. It may follow a mild



attack, even so mild that it is unnoticed and only recollected or recognized when nephritis supervenes. The sooner it comes, the greater is the severity. In the worst cases there is scarcely any urine passed, consisting of blood, albumin and casts mainly. Total suppression is rare. Vomiting is incessant and uremia may cause speedy death with convulsions. In ordinary cases there is general edema, urine scanty, smoky, highly albuminous, with many casts. Anasarca may be extreme, the whole body swelled like a cushion. Respiration is hindered. Some die of uremia, others linger until the malady becomes chronic, but most recover. Other cases are quite mild and may be neglected by the incautious physician, but these are liable to become acute and even fatal with brief warning. There is a tendency to effusion and any of the serous cavities may fill up suddenly.

A joint affection simulating rheumatism sometimes occurs during convalescence, probably septic, which may go on to suppuration. Usually but one joint is affected.

Any of the cardiac inflammations may occur, with arthritis or alone, and ulcerative endocarditis has been recorded. Pleurisy, pneumonia and empyema, are not uncommon. Scarlatina is one of the most common causes of deafness not congenital. Facial paralysis may attend from implication of the facial nerve. Convulsions followed by hemiplegia, ascending myelitis and chorea, are sometimes sequels. Cerebral thrombosis and mental aberration are rare. As occasional sequels may be mentioned edema of isolated parts like the eyelids, symmetrical gangrene, enteritis, noma, ulceration of the soft palate and dry gangrene.

**Diagnosis:**—The most difficult affection to distinguish is an acute exfoliative dermatitis, which comes on suddenly, spreads over the whole body rapidly, lasts five days and desquamates. The throat is not affected. It may recur any number of times. Occurring in an epidemic of scarlatina it could not be distinguished from the latter.

In measles the rash does not appear until the fourth day; it is arranged in crescents, is in larger papules, appears first on the face, has no sore throat but the pillars of the fauces and soft palate are stained a mulberry tint, there is no leucocytosis and Koplik's sign is present. The bronchitis is prominent, the odor peculiar, like "a freshly picked goose," the eyes injected. In *retheln* the rash does not reach its acme all over the body at the same time; and the symptoms otherwise follow measles.

Surgical scarlatina may be the true form, septic, or exfoliative dermatitis.

Diphtheria is not nearly so contagious as scarlatina; the throat affection may be very like, or even identical when there has been this malady superadded to the scarlatina. The characteristic eruption is wanting in

true diphtheria if primary, and the bacteriologist finds Loeffler's bacillus. The writer believes the angina is not always diphtheritic because he has obtained benefit from salicylic solutions in scarlatina much superior to those obtainable from this agent in diphtheria. Sometimes the diagnosis is exceedingly difficult when the diphtheritic rash closely simulates that of scarlatina. A study of the course and spread of the malady may be necessary for complete differentiation. Fortunately, there is little difference in the treatment. Drug rashes are recognizable as being usually partial, transient, non-typical, febrile, and follow belladonna, quinine, iodides, etc.

Diphtheria, varicella, whooping-cough, erysipelas, typhoid and even typhus may coexist with scarlatina.

The infection lasts until the first desquamation is complete. Cases indicating a longer infection are probably due to infection of the clothing or dwelling, where as has been shown, the poison may exist in unimpaired virulence for many years.

Epidemics differ greatly in their virulence, but bad hygienic conditions can at any time generate malignancy. The mortality varies from 5 to 30 per cent. The danger is greater in the young. Hyperpyrexia, early nervous symptoms, hemorrhages, bad breath, parotitis or cervical adenitis, laryngeal complications and the extension of the pharyngeal malady to any of the mucous tracts communicating with the nasopharynx, are bad signs. Nephritis is dangerous in proportion to its acuteness and the degree of renal failure.

**Treatment:**—There is no disease of equal severity and danger in which the efforts of an alert, competent physician are more richly rewarded. Isolate the child at once, in a well-ventilated room, and send all other unprotected persons out of the house. The arrangement of the sick-room is that already described under the head of typhoid fever, to which the reader is referred. Ventilation cannot be too free for the patient's benefit, though it adds to the danger of neighbors.

Absolutely, the first duty of the physician is to see to putting the hygiene of the house and vicinity in perfect order. The writer had the opportunity once to study over 2,000 cases of infectious diseases in one year—typhoid, scarlatina and diphtheria—and he was impressed with the certainty with which malignancy followed bad hygienic conditions; and not any occult "sewer gas," but visible, palpable and "smellable" collections of dirt in house, cellar, alley, backyard, gutter, or cesspool. And the removal of these exerted much more influence on the course of the disease than any other treatment.

Clean up, disinfect and keep clean.



But while about it, it seems unwise to clean up the environment and leave in the patient's alimentary canal the most dangerous of infective materials.

Treat the fever with the Triads. Reinforce the leucocytes by full doses of nuclein.

Wash out the mouth very often with saturated solution of salicylic acid, paying special attention to the throat. If this is done early there will be some cases of dangerous angina prevented.

Much discomfort and some danger may be prevented by applying petrolatum to the skin every day; or benzoinated lard. This also aids in inducing the family to permit free ventilation, for the child will not "take cold" when covered with a coat of grease. The diffusion of the scales is also thereby prevented. Tepid or warm baths should be given occasionally. The patient need not be confined to bed if there is little fever, but must be kept under surveillance as long as albuminuria continues.

The best diet consists of milk and fruit juices, with a little coffee, and vegetable soups. Jaccoud believes the milk diet aids in preventing nephritis. The body should be well flushed by abundance of water. Lemonade is useful and agreeable. Buttermilk is sometimes relished more than ordinary milk and is more diuretic. Ice-cream is useful for the sore throat.

Hyperpyrexia may demand cold baths, or the McCall Anderson compresses. Ice to the throat is always useful.

The cold pack may be used in cases where the system is overwhelmed by the attack, with full doses of glonoin, atropine and strychnine, adding capsicin if necessary. These remedies arouse failing vitality and may save an otherwise hopeless case.

If the throat is well-managed, with salicylic solutions, there is less danger of serious angina; but this whole region should be carefully examined several times a day. Too often the first intimation the physician has of trouble in this part is the bad breath, which indicates that the disease has already made dangerous progress. The treatment is that of diphtheria.

The writer's experience in the epistaxis of scarlatina and diphtheria may be concisely stated: Until he began the use of chromic acid every patient died; since then every one has recovered. Begin at the first sign of bloody discharge.

If the affection spread to the ears, incise the drum and flush with peroxide frequently as recommended above.

For acute nephritis, keep the kidneys flushed with plenty of water, by the stomach, or saline enemas; relax vascular tension by glonoin or veratrine; soothe the irritated tissues by benzoic acid, gr.  $\frac{1}{8}$  every two hours; and keep



the bowels easy by glycerin enemas. Pilocarpine may give prompt relief, but it may sometimes cause pulmonary edema—and the tendencies to dropsy are great. Calcium carbonate, chemically pure, is the most efficient of the diuretics, and may be given in full doses with advantage. Quite often the stimulant effect of strychnine is required. In fact, this is to be given whenever there is any indication of heart-weakness. Many physicians have reported favorably on the use of nuclein in scarlatina, and it may be given throughout in doses of five to fifteen drops a day, in divided doses, dropped on the tongue.

Can scarlatina be prevented? The writer is one who believes it can; by washing the nasal, buccal and pharyngeal mucous membranes several times a day with mild antiseptic solutions; saturating with calcium sulphide; keeping slightly under the influence of atropine; all these until the danger is past and the premises disinfected. There may be a specific influence in chlorine—the writer has recommended the simple expedient of gargling with salt water to hundreds of persons, and found it successful too uniformly to be altogether accidental. When scarlatina is prevalent we see all our little clients frequently, and have them take several times a day a mixture where free chlorine is generated by the action of hydrochloric acid upon dry powdered potassium chlorate (see diphtheria).

Widowitz says that when urotropin is used from the 3rd week nephritis is prevented. Siebert seeks to destroy organisms by applying antiseptic ointments to the skin, and lotions to the pharynx. L. Fischer advises sodium sulphocarbolate gr. 5 to 20 three times a day—hot salines and diuretics liberally, and for the heart sparteine, strophanthus and adrenalin.

Toussaint begins with the administration of calcium sulphide, two granules to adults, one to infants, every half-hour till saturation, then 8 to 12 a day. If white angina appears give the doses every quarter-hour. Rigorous antiseptics of the throat by lemon juice, glycerin of tannin, and boric irrigations. Subdue the violent fever by means of the Triads; a granule of either combination every half-hour when the fever exceeds 38°C. If the eruption does not come out well, add pilocarpine, a granule every hour or half-hour till sweating or salivation occurs; then stop, or continue less frequently. For the angina, hyoscyamine, a granule gr. 1-268, every hour or two, to prevent or correct spasm of the throat. Dysphagia is relieved by sucking granules of cocaine like lozenges. See that patients drink freely. Give milk, and aromatic, diuretic and diaphoretic infusions. Secure intestinal lavage by saline laxative, but avoid diarrhea. Temperature oscillations and returns call for quinine hydroferrocyanate, a granule every half-hour from noon to 6 p. m. even if the fever is then rising. Give no solid food while there is any fever; only milk, with one or two oranges a day.

When the fever has disappeared add light soups, eggs in milk or soft-boiled, without bread, and fruit compotes. During desquamation take all care against cold, which may then cause renal congestion and nephritis. When the urine grows scanty or dark, indicating the admixture of blood, go back to the exclusive milk diet, and give infants brucine, digitalin and iron arsenate, a granule each three or four times a day; to adults digitalin, strychnine and iron arsenates, every four, three or two hours. Let albuminuria be the guide. For distressing itching apply borated petrolatum or mentholated oil, which also prevents diffusion of scales. When desquamation is complete soap and water will remove debris; put on fresh linen and clothes, and disinfect all they have used during the attack. As prophylactic, when one member of a family is attacked and there are others liable, apply antiseptics to the mouth, throat and nose, and give calcium sulphide six to twelve granules a day, to every person liable to the malady.

## MEASLES

Measles is even more infectious than scarlatina. Second and third attacks are not rare, or else there are diseases as yet undifferentiated from measles. It may occur at any age, but few escape an attack in childhood in the cities. Among the inferior races it is especially virulent. Epidemics are more frequent in cold weather. It is communicated by the secretions from the respiratory mucosa, and may be carried on the clothing. The cause is as yet unknown.

There is no characteristic morbid anatomy. The skin is hyperemic, the respiratory mucosa also, and areas of atelectasis are common. The bronchial lymphatics participate in the affection. There may be hyperemia of the stomach and bowels also.

Incubation varies from seven to eighteen days; the malady is inoculable, and then incubation is less than ten days.

The attack resembles that of an acute cold—shivering, sneezing, cough, redness and running of nose and eyes, intolerance of light, aching of the head, back and bones, and great weakness. The stomach is disturbed, tongue furred, the soft palate stained as with mulberries. The whole mouth except the tongue may show the eruption. Fever rises at once, to 102 or more the first day, and 104 or more by the third.

The eruption appears on the fourth day, on the face, as small flat papules, not shotty, spreading downwards over the entire body and extremities. The papules enlarge and the whole skin seems swollen. The papules are arranged in crescents with unaffected skin between. The glands of the neck swell. The rash is most intense on the face. The redness



momentarily disappears on pressure. The fever does not fall when the rash appears but persists till the end of the week, when it drops. Fore-running erythemas are not uncommon, and milia and petechiæ may accompany the rash. White or bluish spots with red areolæ are to be seen at the base of the lower first molars when the mouth is closed. They may be found before the rash.

About the third day of the rash it begins to fade, and desquamation occurs in branny scales. Atypic cases are common; some without the rash, others without coryza, etc. There is a hemorrhagic form, developing under evil hygiene, crowding, low feeding and absence of fresh air. The onset is furious and the child may die the first or second day; or petechiæ develop with mucous hemorrhages and ecchymoses, and death before the fifth day.

The most common complication is catarrhal pneumonia. The fever rises and persists, and the symptoms of pulmonary collapse supervene. In some epidemics nearly every child is thus affected, and nearly all die.

Laryngitis, edema of the glottis, croup, and stomatitis are less frequent than pneumonia. In measles noma, gangrene of the inside of the cheek, sometimes occurs. It is insidious in its appearance, and so rare that its possibility is apt to be forgotten. Ulcer or diphtheria of the vulva has also occurred. The internal ear is often catarrhal, less frequently suppurates. The ophthalmia may be purulent. Catarrhs of the bowel are frequent in some epidemics. Nephritis is very rare.

The special danger of convalescence is the development of pulmonary tubercle. Arthritis, paralyses, and ankylosis of the jaw are rarely seen.

The diagnosis from scarlatina is made from the later eruption, the mulberry palate, coryza, the eruption appearing on the face, and its crescent outline. The spots on the gums are notable. There is no leucocytosis. Roetheln does not show the acme of eruption all over the body at the same time; in other respects it closely resembles a light form of measles, the papules are more shotty, and the influenzal symptoms are wanting, as well as the buccal maculæ. The backache of smallpox is absent from measles. In negroes the presence of influenza is an important means of recognition. Drug eruptions rarely have influenza, regular course, or fever.

Less dangerous than either smallpox or scarlatina, measles is nevertheless to be dreaded in the city slums, in institutions, and in children strumous or predisposed to tuberculosis. The danger lies mainly in the respiratory complications.

**Treatment:**—Put the patient to bed in a well-ventilated but warm room. Measles requires warmth as smallpox requires cold. Keep the air moist by constant disengagement of steam. This eases the cough. Darkness



relieves the eyes. Regulate the sick-room hygiene as in other infectious fevers. The bowels must be made and kept clear and aseptic. The fever may be controlled by the Triads and the cough held in check by emetine, gr. 1-67 every hour, or more as needed. Ipecacuanha was believed to possess a specific power over the respiratory complications, preventing their outbreak and alleviating their violence; but emetine, deprived of the irritant emetic cephaeline, gives the same benefits without distressing nausea. Give as much as can be taken without nausea. An occasional dose of codeine, gr. 1-67, may be given for the cough if the other remedies named do not relieve it.

In an epidemic among the diseased and debilitated foundlings in the Philadelphia almshouse it was found that cases showing malignancy were markedly benefited by brandy.

As leucocytosis is absent in measles nuclein should be given from the start, in doses of ten or more drops a day, divided.

For pulmonary involvement, push the emetine, with the Triads in doses sufficient to control fever. Veratrine possesses a specific influence over pulmonary inflammations; but if the bowels are kept clear and aseptic there is little danger of such involvement.

Cases in which the eruption does not come out and the powers are overwhelmed by the intensity of the poison at the onset, require a cold pack and powerful vital incitation. Give glonoin, atropine and strychnine valerianates, each gr. 1-250 with capsicin gr. 1-67, repeated every ten minutes till a reaction occurs. The same treatment may be employed for hemorrhagic cases. It is evident that unless the vital forces can be aroused there is no hope.

Wash the mouth out several times daily with mild antiseptic lotions, and there will be less danger of noma. Should this occur, burn out the gangrene with the hot iron, and apply turpentine; giving internally the powerful vital incitants mentioned above, and feeding up to the limit of digestive capacity with the richest foods.

But with good hygiene, aseptic bowels and good nursing, these dreadful things do not occur in measles. It is among the ignorant occupants of the crowded city slums that measles becomes terrible.

Toussaint says the leading indication is to combat the infectious element. For this calcium sulphide is his chosen remedy, in doses of 4 to 12 granules a day, according to age. To bring out the eruption he adds pilocarpine 5 to 10 granules in two doses three to four hours apart, or one granule every hour till sweating begins. Warm drinks may be also given but not continued too long. Stop when the rash appears or debility will follow. During the whole course of the attack attend rigorously to

the hygiene of the mouth, throat and nasal passages, using sprays of boric acid solution and lotions of boric glycerin. Oppose the fever, which is sometimes very high. The Triad if it does not cause the fever to break before the usual time for defervescence, will at least moderate it, and by holding the organism under the influence of the defervescent alkaloids prevent congestion of the lungs. When the eruption is well out and the fever subsides, the doses should be farther apart but the Triad and sulphide continued, to prevent the bacilli penetrating and locating in the lungs. If bronchopneumonia should occur, the treatment should be pushed intensively: Put on a cotton jacket; apply sinapisms every three hours over the affected lung, or to the back and chest; continue the Triad for fever; combat the cough and oppose the proliferation of the infectious element by brucine, codeine and calcium sulphide, a granule each every half-hour; sustain energetically the forces of the little patient with milk, cinchona, grog, with coffee; if needed give brucine and caffeine, whole granules or dissolved, at proper intervals during the day; for repeated epistaxis, ergotin, quinine hydroferrocyanate, a granule each every quarter-hour; for grave cases with urine scanty, red and thick, to induce drinking give refreshing tisanes of mallow flowers or cherry stems, even to very young babes, keep up to the last day the rigorous antisepsis of mouth, throat and nose; keep the bowels free but shun laxatives that may cause diarrhea, employing enemas, emollient for constipation, starchy for diarrhea; forbid solid food until the complete disappearance of the malady and its complications; after the recovery keep the patient indoors for two weeks, and from school for another week. The child, its clothes, bedding and the sick-room should be disinfected.

Toussaint speaks of the mortal complications of measles as noted in a two months' epidemic in his locality. Hundreds of children were attacked and many died of bronchial pneumonia. One of his patients died within 48 hours of suffocative catarrh; two died of convulsions during the eruptive period.

It is known that bronchitis appearing during the course of an infectious malady is much more serious than a similar attack due to cold. When bronchitis due to cold reaches the smaller bronchi a cure is the result; that occurring during whooping-cough is graver, but here also there are more cures than death. When influenza or measles is complicated with bronchial pneumonia the prognosis varies widely according to the epidemic; some furnishing a mortality truly frightful for young infants (Veillard).

Calcium sulphide, administered in intensive doses from the onset of the first attack, should be continued throughout as the basis of medication, while the inflammation itself is combated by defervescent alkaloids added on



occasions by baths, compresses cold or warm, sinapisms, dry cups, etc. He thinks with Veillard that one should abstain from blisters in infectious maladies. They depress the little patient and are often the point of departure of ulcerations very difficult to cure.

Suffocative catarrh is nothing else but a capillary bronchitis generalized. The fever is violent; rales sibilant, bubbling, sonorous, are diffused over both sides of the chest; oppression increases every minute.

If there is time we apply daily cups in great number or envelope the thorax in vast mustard poultices; or we put the infant in a mustard bath. If the child can swallow we frequently give with success an emetic, which temporarily free the bronchioles. The infantile Triad (brucine, aconitine and digitalin) is then given in suitable doses to reëstablish the circulation in the engorged lungs. But too often the physician is called when the life of the little patient is already compromised and he cannot prevent asphyxia accomplishing its work. This was the case with the first child mentioned as dying. It had been seized the preceding evening with measles, the third attack in the family within 10 days. The other two were better. The eruption came out badly, the lungs became inflamed, the condition was aggravated, and when the doctor was called on the second day he found the child suffocating.

The other two died in convulsions. They were very strong and well-developed, but exceedingly nervous. The first had played for six days in the room with his little morbillous brother. January 21st he commenced to sneeze and cough, the eruption appearing next day. At 2 p. m. after some grimaces and nervous movements he entered the crisis. At first partial and affecting a part of the face, arm and leg, the spasms quickly assumed the chronic form and left him not a moment of repose during 10 consecutive hours. Hot baths, mustard baths, flagellation with towels dipped in cold water, ether by inhalation and internally, chloral enemata, were all tried. Overcome by a conflict which would have strained a giant, the little patient died without regaining consciousness. The second child died in identical fashion. A chloral enema seemed for a time to suspend the spasms, but they returned more severely and the child died without regaining consciousness, after eight hours of the most horrible torture.

Possibly chloroform inhalations and morphine injections as proposed by Le Grix, might have done better.

We cannot but look upon this record as a further illustration of the limitations of French Dosimetrists. In this terrible emergency they desert the well-tried remedies of their own advocacy, and have recourse to the inefficient methods and weapons of the older practice. We feel confident that in active, well-chosen applications of such remedies as pilocarpine,



atropine, morphine and colocynthin, better results could be obtained. Eclampsia is autotoxemia, and pilocarpine most quickly relieves conditions due to the retention of waste products in the body. Before its tremendous power, its prompt action in unlocking the gates of elimination, how paltry appear the weak and ineffective measures instituted by our colleague.

### RÆTHELN

Under numerous titles, German measles, French measles, rubeola, roseola, rubella, scarlet rash, a fourth member of the exanthemata has been recognized in comparatively recent times. It was thought to be a hybrid of measles and scarlatina for some time, but is now acknowledged as a distinct disease. It is as contagious as measles, and like it occurs in epidemics.

The symptoms are quite similar to those of measles but milder. The incubation lasts ten days or more. The invasion shows chilliness, aching in the head, back and legs, coryza, a macular rosy eruption on the soft palate, a little fever, and on the first, second or third day a rash, first on the face and spreading downward, covering the whole body within 24 hours. It resembles measles but is brighter and less crescentic. It begins to fade first in the face, reaching its acme there before it does in the extremities. The cervical glands are swollen and sore. Other lymphatic glands also swell. Albuminuria and nephritis are more frequent than in measles. Pneumonia, jaundice and colitis are occasionally seen. Sometimes this malady becomes as severe as bad forms of measles, but is usually very similar but milder in the whole range of its symptoms.

The treatment is that of measles.

### WHOOPING-COUGH

The writer believes this to be the most contagious of all diseases. His own children took it while passing several yards from an infected child on a steamer. It probably depends on a bacillus found by Koplik—small, with rounded ends, somewhat larger than the influenza bacillus. It is to be found in the mucous clumps; is a facultative anaerobe, pathogenic for mice. Epidemics are frequent in the cooler months and often precede the exanthemata. It occurs more frequently among children, even in early infancy; they are immune. It affects the aged sometimes, dangerously; it is self-protective; it is especially fatal to negroes, and in London is one of the chief causes of children's death.

There is no special anatomy. Respiratory affections are the causes of death.

The incubation lasts seven to ten days, with no symptoms. The catarrhal stage commences with coryza, slight fever, red eyes, dry cough, in no way distinguishable from an ordinary cold. Suspicion is not, as a rule, aroused until about the time an ordinary cold would be breaking up, when this begins to display its spasmodic character, the cough becoming dryer and more troublesome. Three things arouse suspicion before the whoop begins: The cough occurs in paroxysms; they awake the child from sleep; and he coughs till he vomits. Then comes the distinctive cough, with a number of spasmodic expiratory efforts, followed by a long-drawn crow or whoop, drawing the air through the contracted glottis. He gets red in the face, his nose may bleed, and points of blood be forced out on his temples from the violence of the straining. From 20 to 24 paroxysms occur each 24 hours. The efforts continue until a mass of tough adhesive phlegm is ejected, much or little. The face is swollen and the eyes protrude, the countenance cyanotic. Children run to their parents for support when the paroxysm comes on. The attacks may be induced by temper or any emotion. Sometimes the vomiting is so constant that the child suffers from innutrition.

The duration of an attack is not uniform. The laity say it runs up nine weeks and down the same period; but it may be shortened, and, again, habit may indefinitely prolong it.

Hemorrhagic effusions may occur about the temples, the eyes, or from the respiratory mucosa.

Convulsions are rather common in bad cases. Paralysis rarely ensues. Sudden death has followed bleeding under the dura. Emphysema, pneumothorax, catarrhal pneumonia, lobar pneumonia, pleurisy, hypertrophy of the bronchial glands, valvular disease, albuminuria and glycosuria are among the complications and sequels. Leucocytosis occurs early.

The whoop is not distinctive, since it occurs with other laryngeal affections. The three symptoms mentioned, followed by the whoop, are characteristic.

Whooping-cough is especially dangerous to very young and to feeble children.

Affected children must be isolated and kept from the schools until the danger of contagion is past. The treatment is quite satisfactory. Many claim that the malady can be jugulated by keeping the patient saturated with calcium sulphide and slightly under the influence of atropine. Give of the former a grain every hour till the breath and skin smell of the drug; then enough to keep up this effect. Give atropine gr. 1-500 every hour, or a corresponding dose suited to the age, until the child speaks of dryness



of the mouth or the skin becomes reddened; then continue enough to keep up this effect. Many cases have been reported in which this treatment was given to unprotected children exposed to the infection who had shown no signs of an attack, and have in subsequent epidemics proved immune. It is believed that they had taken the infection, but it was destroyed by the sulphide in the incubative period.

Many other methods have been employed and some have given good results, such as that of full doses of quinine—gr. 3 to 4 for a child of 2 years old, every four hours—but none has done as well as that described. Fumigating the bedroom and clothes with burning sulphur has been lauded. Local applications of various antiseptics are used. It is probable that the quinine acts in this way, since it is best when given in syrup of yerba santa and not in pills.

Toussaint thus summarizes the treatment of the French dosimetrists: Calcium sulphide forms the dominant. It may be given with success as a preventive in an epidemic, in doses of 8 to 12 granules a day, according to age. Make the toilet of the mouth and nasal passages many times a day, also, to prevent the access of the microorganisms.

Saturate the patient with sulphide and keep up the influence of this parasiticide. During the catarrhal period soothe the cough with codeine, iodoform, helenine, a granule each at each paroxysm. Prevent viscous accumulations in the bronchi with emetine and codeine, scillitin, and in certain cases pilocarpine; some doses of each in the morning. Repeat in the evening if the paroxysms are not followed by free expectoration. During the spasmodic period give atropine valerianate, a granule every two to four hours, according to age. For very young infants this granule should be dissolved in four to six teaspoonfuls of sweetened water or black coffee, and a teaspoonful given every half-hour. Combat the intermittence and recurrence of paroxysms with quinine hydroferrocyanate, one to four granules. Sustain the heart, if enfeebled, with brucine and digitalin, a granule each every half hour till better. For epistaxis with paroxysms give ergotin and quinine hydroferrocyanate, one to four granules. For vomiting give morphine, brucine or strychnine and hyoscyamine. Watch the bronchi, as fatal complications may arise here. At the first indication apply sinapisms and give the infantile Triad until the temperature returns to normal. If the paroxysms are very frequent at night give narceine, codeine, butyl-chloral, a granule each at bedtime. Sustain the vitality with brucine, iron phosphate, strychnine, lime and soda hypophosphites, one to four granules each, daily. For anorexia give brucine and quassin, one granule each before meals. In happy cases two granules of calcium sulphide and one of camphor monobromide every hour suffice to cure



in some weeks. Boucher cured one case, a babe of 9 months, in eight days.

Le Grix quotes a non-dosimetric friend who tried calcium sulphide, with camphor monobromide, in whooping-cough. His report was that—"No other treatment up to the present has given me effects so precise, so remarkable, especially in four cases. In the others the treatment, ill-followed, appeared to notably modify the course of the affection."

Salivas employed the same combination in a severe case, with good results, even with smaller doses. A man aged 51 was seized with a terrible attack, resisting treatment by drosera, aconite, morphine, chloral and bromides. After two months of suffering he was placed on the above combination, with morphine. The results were satisfactory.

Frank said that one might cause the patient attacked with whooping-cough to die before the end of the attack, but cure it—never! Salivas says that we attack the pathogenic agency at that same time that we sustain the vitality of the patient, this constituting the dominant treatment. For this purpose, after having cleared the respiratory passages of obstruction by an emetic, three granules of emetine, gr. 1-67 each, every ten minutes till effect, we administer calcium sulphide, a granule gr. 1-6 every half hour at first, later every hour; with brucine three to six granules, each gr. 1-67, per diem, separately from the sulphide.

If the paroxysms assume the characteristic type we combat the spasmodic element by adding to the above camphor monobromide, a granule with each dose of sulphide, and atropine valerianate a quarter, half or whole granule; according to the age of the patient, every three or four hours. This completes the dominant treatment.

The variants are directed against the complications.

If measles appears we care for it without suspending medication directed against whooping-cough.

If engorgement of the lungs supervenes, capillary bronchitis, we make, without loss of time, mustard applications to the back and chest, and prescribe the Dosimetric Triad.

Ulcers of the lingual frenum, so common in whooping-cough, are to be cauterized with silver nitrate, or many times touched with boroglyceride.

During the paroxysms watch the patient closely and hold the head inclined forward to facilitate the expulsion of encumbering mucus. If syncope occurs, nevertheless, it is necessary to have recourse to revulsives, Mayor's hammer, artificial respiration, rhythmic tractions of the tongue.

For the innutrition due to repeated vomiting of food make the patient eat after the paroxysm, giving but little food each time, but multiplying the meals.

During the third period change of air and tonics are indicated prevent relapses. Isolate patients, quarantine houses and disinfect.

The dominant treatment is filled by calcium sulphide, in high dose and regularly, to preserve for some time the constant action upon body of an interior atmosphere of sulphydric acid. As a variant against the nervous element give codeine or camphor monobromide.

According to age, ease of swallowing and toleration, we give two five granules of calcium sulphide every two hours, or more frequently when the first spasmodic paroxysms occur; or even in the catarrhal period if significant circumstances allow us to foresee the later development spasmodic catarrh.

At the outbreak we may hope for jugulation by active and very regular treatment. Injurious effects of the sulphide need not be feared, for they are none; some nausea caused by the bad odor, some belching, and that is all. Infants take the granules easily, if large enough, and accustomed to dosimetric treatment. The following case is described:

October 18 a girl of ten years, strong and robust, sanguine but very poor, was attacked with whooping-cough and the patient first seen during the second stage. She had already taken, without success, quinine, chloral and codeine.

**Treatment:**—A general lukewarm bath; calomel and antithermic regular diet, as nutritious as possible, meat and wine. She was confined to one room with phenol evaporating constantly. Calcium sulphide a granule every half hour; codeine, a granule every hour. During the day exercise in the open air in the garden.

At the end of two days the patient was evidently improved. The paroxysms had lessened from 30 to 8 per diem, the vomiting had ceased, the nights were tranquil, with some hours' sleep. During ten days improvement was constant and progressive, and as the cough improved the general condition of the patient advanced equally. Twelve days after the first visit she was cured, having only a little, soft cough. Her appetite was excellent, she digested well, and all other functions were performed normally.

Many physicians believe that whooping-cough pursues a regular, unvarying course, with which treatment will not interfere. This view is the cause of many ills. That whooping-cough is a grave and often mortal malady by itself, or with its complications, leaving after it more or less enduring consequences, no physician today will deny. But we maintain strongly today that it is the negation of aid from the art of medicine which plays the most important part in the want of success and the and lamentable accidents with which this malady is accused; for,

all other maladies of the human body, this one is susceptible of treatment and of cure; and if treated with intelligence the cure obtained is more complete and sure than that which nature affords.

We do not deny that there are unfounded enthusiasms prevalent concerning the art of curing, but we love, without reserve, to render justice to the power of medicine. It is the want of a reasonable confidence in its power which has caused our art to lose its prestige, its opportunity and its force.

Laura thus treated severe whooping-cough: The room should be large, well aired, kept at a uniform temperature; in fine weather the child may spend the day in the open air; clothe in light wool; avoid fatigue, emotion, night-air, immoderate laughing or crying; feed carefully easily digestible nutritious food; the basis milk, soups, chocolate, meat, eggs, somatose, peptones. If the child vomits its food, give more.

Medicate by indications; secure sleep; for fever, aconitine, quinine, hydropathy; for the spasmodic element, hyoscyamine, codeine, atropine, croton chloral, camphor monobromide, iodoform, singly or combined. Helenine merits a place, from its action disinfectant, antimicrobial, tonic expectorant; it restores the digestion and sustains the nervomuscular action of the stomach. Intubation or tubage may be required.

Quinine, by its power anti-infective, sedative and tonic, is a remedy of the first rank. Calcium sulphide is the antimicrobial for older children. Applications of cocaine and resorcin are useful. Inhalations, sodic, bromic, of eucalyptus, chamomile, or terebinthinate, are excellent adjuvants.

In the late catarrh the balsams, emetine, kermes, terpine. For cardiac debility, digitalin, caffeine, strychnine. For gastric debility, gastro-nervous modifiers. Diligent asepsis of the nose, mouth and throat.

For the frequent anemia, iron, arsenic, glycerophosphates; perfect feeding and the climatic cure.

Berchon describes a case of whooping-cough occurring in a boy of five years. He had been eight days ill. Four days later he presented the characteristic paroxysms, which were frequent, with some fever and no vomiting. He was placed upon calcium sulphide, a granule every hour, following five granules of emetine, given to clear the respiratory tract. Camphor monobromide, a granule every hour, was added for the spasmodic element.

The paroxysms became more frequent, reaching 20 within 24 hours, although shorter in duration. The two remedies above named were ordered then every half hour, with atropine valerianate, a granule every four hours.



The number of paroxysms diminished to 15 each 24 hours, with two vomiting spells, the general condition being good. An increase in symptoms attended constipation, and movement followed immediately after the action of a saline laxative. Nevertheless, the treatment embraced a period of 29 days, making the total duration of the malady 37 days.

This is by no means such a result as Coleman had obtained. The remedies do not seem to have been pushed to their full effect and the alimentary canal was certainly neglected. The most important observation in this case, however, was that a brother of the sick child, aged three years, remained with him during the entire course of sickness, taking 6 grains of calcium sulphide a day, and did not contract the malady. To one who realizes the certainty with which a person liable to whooping-cough will contract it under these circumstances, this being the most infectious of all known diseases, this observation is entirely significant, especially since it has been confirmed in numerous instances by Coleman and others.

Kortz relates a case of pseudo-whooping-cough. The patient was a boy, aged three years, thin and delicate, disposed to rickets. For some days he had paroxysms of cough, worse at night, no fever, appetite about as usual, five or six paroxysms occurring each night. The submaxillary glands were swollen, the chest full of the large, moist rales of bronchitis; cough syrups did no good and emetics were inadvisable, as he vomited much at the paroxysms. Percussion furnished no evidence. The paroxysm of cough at the outset resembled that of whooping-cough, but was aborted in about ten seconds.

This appeared to be not true whooping-cough, but a heavy cold in a lymphatic child, with exaggerated ganglionic development.

Sinapisms were applied twice a day to the back and chest; one granule of calcium sulphide ordered every hour; one granule of camphor monobromide every two hours to oppose the nervous element; to combat the lymphatism sodium arsenate gr. 1-67 before meals, daily.

In four days there was evident amelioration, the lungs relieved of rales and the paroxysms less frequent and shorter, vomiting less frequent. Treatment continued, except the sinapisms, and the arsenate given three times a day, the daily dose being gr. 1-67. Four days later the bronchi were free, the paroxysms like the preceding but further apart and briefer, while the child's general appearance was improved. The same remedies were continued less frequently, and during convalescence calcium phosphate added for the rickety tendency.

The hopeful and confident tone of these reports is notable.

Coleman claims it is possible to make a diagnosis of whooping-cough within the first three days of the catarrhal stage. He calls attention to

the broken, quick, expiratory spasmodic cough, in patients known to have been exposed and non-immune; a small tumor under the tongue at the root of the frenum, the size of a split pea; hypertrophy of the tracheo-bronchial glands; and a string of hypertrophied glands running from the angle of the lower jaw to the sterno-clavicular articulation.

Illoway calls attention to a prodromal sign, in a slight hacking cough occurring a few times during the day and later at night without disturbing the sleep. This may precede whooping by four weeks. The longer it lasts, the more severe the attack will be.

### MUMPS

While mumps is an infectious malady its cause is as yet undetermined. It is most frequent in children, in the spring and fall. It is highly contagious, and getting into a school will affect every child except the few who seem to be immune. After the twenty-first year it is rare.

The incubation lasts two to three weeks, with no symptoms. The attack is marked by slight fever, with pain in the parotid gland on one side. This soon swells and becomes tender. The other side may or may not be affected. Sometimes the submaxillary and sublingual glands are involved. It becomes difficult to open the mouth and impossible to chew. Any food that excites saliva causes acute pain. A cruel domestic means of diagnosis is to induce the patient to take a bite of pickle; which causes exquisite suffering. The pain may radiate to the ears and otitis develop. In about a week the malady subsides, taking longer if the second gland is not affected till late. Sometimes there is metastasis to testes or ovaries, but only in persons past puberty. Great suffering ensues; the attack runs its course there and subsides. There may be a urethral discharge of pus. One or both sides may be affected. Atrophy may result, with impotence if on both sides. Girls may have vulvovaginitis, and the breasts in either sex may swell and become sore.

High fever with delirium occasionally occur; meningitis rarely; hemiplegia, coma, mania, arthritis, albuminuria, uremia, endocarditis, facial paralysis and metritis, are sometimes seen. Very rarely the parotid suppurates. Deafness is not unusual. The eye may be injured; the nerve atrophying. Relapses may occur. The gland may remain enlarged. A long list to follow mumps, but they are collected industriously, as men in active practice for a lifetime may not see one of them.

The diagnosis is easy; the parotid swelling, with aggravation of the pain on taking into the mouth anything sapid; occurring in persons who have been exposed and are not immune.

**Treatment:**—Keep the child quiet, clear out the bowels and give few granules of aconitine. Possibly pilocarpine may abort this malady—try it in full doses. Cover the swollen glands with belladonna plaster—Metastasis calls for the use of hot or cold applications as may be most agreeable. During the writer's absence from home his son, aged 11, showed symptoms of mumps. He had never had this disease and had been fully exposed. His mother at once gave him enough atropine to dry his mouth, and saturated him with calcium sulphide. Within two days the attack was broken up, and he subsequently associated with children affected with mumps, with entire impunity.

Toussaint speaks of a characteristic symptom. If the finger is introduced into the patient's mouth the finger remains dry, saliva being absent. In grave cases the ordinary expectant treatment becomes a serious fault. The treatment should be that of infectious maladies in general, the principal indication being met by calcium sulphide, which should be given during the entire course of the disease and some time longer to prevent relapses. The daily dose is the same as for measles or scarlet fever, 1 or 2 granules every half hour, according to the age, until saturation; then 12 to 16 every 24 hours.

The fever should be moderated by suitable doses of the infantile Triad (brucine, digitalin and aconitine), continued until the temperature falls to 37 1-2 degrees C., and after that according to the need.

The swollen glands should be covered with absorbent cotton impregnated with oil of chamomile, containing camphor and morphine and covered with silk.

A careful toilet of the mouth and throat should be made two or three times a day, with a solution of boric acid. This is indispensable.

Orchitis, mammitis and ovaritis are treated by applications of hot opiated oil, cataplasms or better "cottonplasms;" or if suppuration is feared, by mercurial inunctions.

Fever is attacked by the infantile Triad if the patients are under 6 years of age.

For the saburral condition give small daily doses of saline laxative.

For vomiting give soda lemonade, or champagne.

The dieting is very difficult. It should be exclusively liquid—soup, milk, beef and chicken tea, etc.

Patients should be isolated and those exposed to contagion should take calcium sulphide, 8 to 12 granules a day as a prophylactic for 20 to 25 days. When the patient has recovered, the house should be disinfected and all playthings and other substances which have been used about the patient's mouth should be burned.



This description leaves much to be desired. Of profound interest is the effect which pilocarpine would have in this malady in minute doses and when pushed to full effect. The treatment for metastasis is also unsatisfactory and the effect of atropine here deserves careful study.

## PNEUMONIA

A specific fever caused by the invasion of the lung by the pneumococcus, or micrococcus lanceolatus. The disease affects one or more lobes, in one or both lungs, commencing at the apex of each lobe and extending toward the pleural surface, with variable rapidity. There are three stages.

**Hyperemia:**—The tissue is dark-red, firm, heavy, but floats in water, the air-cells distended, and if any lobules are collapsed they can be inflated by the bronchus. Extravasation may occur near the pleural surface. The epithelium is swollen, capillaries engorged, air-cells and bronchioles filled with epithelium, red cells and some leucocytes.

**Red Hepatization:**—The lung is solid, airless; liver-like, mahogany color, dry, mottled, swollen, too heavy to float, not inflatable, friable, the air-cells and bronchioles filled with fibrinous plugs that give the cut surface a granular appearance. The pleural surface is covered with fibrin. The fibrinous plugs contain red, pus, and epithelial cells. The connective tissue is sometimes filled with leucocytes and fibrils, the vessels are pervious and pneumococci are to be found—sometimes streptococci and staphylococci.

**Gray Hepatization:**—As the exudate becomes fatty the color pales, the tissue softens, the exudate liquefies, and numerous leucocytes invade the air-cells. Resolution sets in and the exudate is largely removed by the lymphatics. But the attack may not terminate so favorably. Suppuration may occur, pus cells infiltrating the tissues and air-cells, possibly ending in abscess from streptococcal conquest of the enfeebled tissues. The abscess may discharge or caseate. (See Pulmonary Abscess.) Gangrene is a rare ending. Induration sometimes ensues, the alveoli filled with new connective tissue.

The heart-muscle is pale, the blood highly coagulable; pericarditis, endocarditis, desquamative and intestinal nephritis, and rarely meningitis, may complicate. The spleen is congested, the stomach and bowels catarrhal.

**Etiology:**—The pneumococcus of Frankel is lance-shaped, occurs in pairs, is often found in the nose and mouth of healthy persons and especially in those who have had pneumonia. It may be demonstrated in

the sputa by treating a cover-slip preparation with glacial acetic acid, washing off the acid, and adding anilin oil and gentian violet, pour off and renewed several times. Other organisms are found in the sputa such as Friedländer's and Eberth's bacilli, influenza bacilli, streptococci, etc., and it is probable that they also cause the disease we term pneumonia alone or with the pneumococcus.

Palier asserts that the ordinarily harmless diplococcus of the mouse, gaining access to the mouse, there develops the virulence that enables it to arouse pneumonia when transferred back to the human respiratory tract. Birchmore believes there are at least three forms of pneumonia infection, the most fatal being that attacking travelers, with insidious attack.

Infection occurs by inhalation of the causal microorganisms, pneumococcus perhaps opening the way for the others. Predisposing causes are, 1, endemic influence, certain buildings becoming infected; 2, epidemic influence, and direct contagion; 3, season, the cold and wet of winter; 4, exposure to cold, lowering the vitality of the tissues; 5, point when the ever-present pneumococcus can successfully attack them; 6, age, the extremes of life being most liable; 7, sex, whose only influence is as to relative exposure, males being most frequently attacked; 8, hygiene, the crowded city slums showing the most and worst cases of alcoholism; 9, typhoid, measles and other septic fevers are sometimes complicated with pneumonia; 10, it occurs as a terminal malady to fatal cases of other diseases, as in the last stages of chronic nephritis, diabetes, cancer, heart disease, etc.

Climate has some influence on pneumonia, it being somewhat more fatal in the south, where the vital resistance is less than in those who have been toughened by exposure to the northern winters. But in every part of our country, north and south, in the hot moist air of Florida and the thin dry atmosphere of the Rockies, the bleak barrens of Canada and the rich jungles of the Mexican coast, pneumonia prevails as one of the principal causes of death. The causal agencies are omnipresent. One attack predisposes to another, and this is easily comprehended when we find the pneumococcus a life-long guest in the mouth, ready at any time to attack its host again, when his vitality is low.

Pasteur found it impossible to inoculate the cock successfully with the pneumococcus, that bird's normal temperature being higher than man's. But when he was placed in a refrigerator till his temperature fell to 98° F., the pneumonic infection took place. This throws light on the attacks following exposure to cold, especially when the vital resistance is paralyzed and the body heat reduced by alcohol.

The serum from the blood of convalescents contains an antitoxin which cuts short the disease in others, inducing crisis. The pneumococcus generates pneumotoxin, which causes fever; and acting on the body-albumin generates an anti-pneumotoxin, which neutralizes the toxin in the blood as it is formed. It has not yet been isolated.

**Symptoms:**—Sometimes when one has "taken cold" from exposure there are several days of malaise, illness without demonstrable disease of the lung. The patient knows he has contracted a malady, but apparently it has not yet established itself at any one locality. In such cases it is probable that a slight pneumococcus invasion has taken place at the apex of one lobe, the microorganisms being so few in number that repeated hatchings of new broods are necessary before they can produce typical symptoms. Meanwhile the infection is spreading slowly up the lobe, and in due time the identity of the disease is established.

In other cases the attack opens abruptly with a chill, followed by fever up to 104 degrees, oppression of the chest, substernal soreness, rapid pulse, the skin hot and dry, the cheek on the affected side showing a curious red flush, headache, weakness, anorexia, thirst, very often delirium. Deep inspirations do not cause acute stitching pain until the disease has spread through the entire lobe to the pleura. Respirations are hurried and shallow, 30 or more per minute. Cough is irritative, dry, painful, the sputa at first scanty, gray and sticky, soon becoming rusty, and stained with bright blood when collateral hyperemia develops. Little children have a peculiar catch in the breathing, just before expiration, which is quite characteristic. There may be gastrointestinal catarrh, at first or at any time later, with anorexia, nausea, vomiting or diarrhea. If marked, this is a dangerous element.

The patient lies on the affected side, mouth open, lips stained, eyes bright, speech restrained by the painful and rapid breathing. In alcoholics the delirium may simulate delirium tremens. An eruption of herpes often appears about the nose or lips. The fever rises as night approaches, the daily range being about one degree. The pulse runs to 100, being slow in comparison with the fever.

The malady continues in this manner until the fifth, seventh or ninth day, when in favorable cases crisis occurs, with a sudden fall of temperature below normal, profuse sweating or diarrhea, great, sometimes fatal prostration, and relief from the dyspnea, cough and other distress. Convalescence goes on rapidly, but the evidences of consolidation may be detected for weeks after the crisis.

In other cases crisis does not occur, but purulent infiltration supervenes, the symptoms decline by lysis, convalescence is protracted, and the patient



recovers with more or less damage to the lung; perhaps none, perhaps some fibrosis or atrophy.

**Respiration:**—The patient breathes from 24 to 60, children 90 or more, times per minute. He pants, restrains the thoracic movement, and suffers dyspnea in proportion to the fever. When several lobes are affected the collateral fluxion in the remainder renders the oppression almost unbearable. Bronchial catarrh coexists to some extent. The rate of the respiration to the pulse is 1 to 1.5 or 2, instead of 1 to 4 as in health. The pain develops with pleural involvement, in several hours or more, and lasts three days. It is made worse by coughing. The cough is dry, harsh and constant, repressed after pleurisy develops, but may be much less annoying in the aged, in alcoholics and when delirium is marked.

The sputa are at first gray and adhesive, becoming blood-stained or rusty in a few hours, and mucopurulent, abundant and thinner at the crisis. In aged and prostrate subjects they resemble prune-juice. If collateral fluxion is marked it is frothy and bright bloody; if edema develops it becomes serous. Aged patients are apt to swallow it and have to be compelled to cough up "from the bottom of the lungs" to obtain enough for inspection. Red cells, pus cells, epithelium, fibrin casts and the pneumococcus, may be found by the microscope.

**Fever:**—The temperature rapidly rises to 104 or more, fluctuates a degree daily, and drops rapidly to below normal at crisis. Children may have an initial convulsion instead of a chill. Aged and weakly persons may have lower fever. An attempt at crisis (pseudo-crisis) may precede the true crisis a day or more. Hyperpyrexia, 105 to 107°, may precede crisis, which is more apt to come by night. Febrile rises may occur during convalescence, from slight causes, such as an unpleasant visitor, too heavy a meal, etc. Failure of crisis to appear on time may indicate a complication, or purulent infiltration.

**Circulation:**—The pulse runs about 100 and if above 120 indicates danger, as threatened heart-failure. This is due to the fever, to the increased task of the heart in driving the blood through the lessened number of capillaries in the non-pneumonic lobes, themselves engorged by the collateral hyperemia, and to the decreased nutrition of the heart from the abstraction of fibrin from the blood and from the interference with nutrition. Pericarditis sometimes occurs, and this, or previously existent heart-disease, increases the danger. A small rapid pulse, with irregularity and dicrotism, betoken danger. If full and abounding the tension is low. Increased tension in the pulmonary vessels accentuates the pulmonary sound (second sound, heard in the left second intercostal space, an inch from the sternum). If the right ventricle weakens dilatation results.

Leucocytosis is marked, continuing until the true crisis. Polynuclear forms of white cells prevail during fever, diminishing as the eosinophiles multiply. The red cells and hemoglobin decrease rapidly after the crisis. The blood-plates increase.

**Nervous System:**—Headache occurs at the start and may persist. Convulsions may be present in children. Delirium is common. If the fever is high it is of maniacal type, while in septic states it is low, muttering, with a tendency to coma. Drunkards exhibit typical *mania a potu*. When fever runs very high the symptoms may simulate meningitis.

**Skin:**—Herpes of the nose or lips is of some importance in diagnosis. Profuse sweats mark the crisis. The well-defined flush on the cheek of the affected side has been noted. Urticaria occurs sometimes.

**Digestive System:**—The tongue is dry and brown in high fever and great debility, covered with a uniformly yellowish-white coating invariably. Marked vomiting or diarrhea may indicate infection of the alimentary canal, and such cases are apt to prove fatal. The spleen is enlarged, not the liver.

**The Urine:**—The urine is scanty, red, of high specific gravity, urea and acid in excess, chlorides deficient. Some albumin is often to be found.

**Physical Signs:**—First stage: Expansion lessened; costo-abdominal breathing in double pneumonia; tactile fremitus slightly increased; percussion normal or briefer, higher pitched or tympanitic; crepitant rales, vesicular sounds weak over affected lobe, exaggerated over healthy lobes.

Second stage: Little expansion over affected side, increased on side unaffected; vocal fremitus increased usually, friction sounds often; percussion dullness over affected lobes posteriorly, tympanitic anteriorly, Skoda's resonance above affected lobe; bronchial breathing, bronchophony, sometimes egophony, subcrepitant rales from bronchitis, friction from pleurisy.

Third stage: Expansion returning, fremitus lessening, dullness slowly disappearing, crepitant rale redux, coarser than in the first stage as the exudate is softening; bronchial breathing, gradually replaced by vesicular sounds.

**Complications:**—Pleurisy, usually fibrinous, is always present when the pneumonia reaches the pleura. If the pleuritic symptoms are prominent the malady is termed pleuropneumonia. Empyema may supervene. Acute bronchitis may coexist. Collateral fluxion may occasion edema, the dyspnea reaching its highest point and the patient dying if not promptly relieved. Pericarditis may result from extension in left pneumonias. It is more frequent in children. Endocarditis is more frequent, especially the ulcerative form; betokened by septic fevers, chills and sweating, with embolism and meningitis. It is due to infection of the endocardium by the

pneumococcus. Heart-clot, venous thrombosis and arterial embolism occur rarely. Acute suppurative meningitis is rare but grave; with intense headache, stiff neck, wild delirium, gradually subsiding in coma. Peripheral neuritis, parotitis, real rheumatism and pneumococcal arthritis have been noted. Croupous gastritis is rare, croupous colitis more common. Jaundice is frequent in severe forms. Peritonitis is rare, as in acute nephritis of a mild grade.

**Varieties:**—Typhoid pneumonia is characterized by the typhoid state, profound prostration, low delirium, stupor or coma vigil, heart feeble, tongue brown, fever moderate, skin dusky or yellowish.

Epidemic pneumonia is often malignant. In "larval pneumonia" the general symptoms are mild, the signs obscure.

Latent pneumonias begin at the lobar apex and never reach the pleura. In emphysematous subjects the signs may be masked.

Migratory pneumonia extends to other lobes as each recovers, so that crisis is lost.

Bilious or malarial pneumonia has prolonged chills and paroxysmal fever, jaundice and vomiting.

In the aged the onset is insidious, gastrointestinal symptoms marked, prostration profound, fever low and irregular, local symptoms inconspicuous. Dullness, shallow bronchial breathing and subcrepitant or serous rales are to be detected. The cough may be wanting. The malady is very fatal.

Death may follow from the specific toxemia with little involvement of the lung tissue, with heart failure or coma. Other organs may be infected with the pneumococcus.

The inhalation of ether in cold weather, especially in abdominal operations, is often followed by pneumonia. Relapses are very rare.

The course runs from three days to as many weeks or more, the average duration, according to Osler, being ten days. Resolution may be postponed to the tenth week. It may leave the lung-tissues normal, or there may be cirrhosis, abscess or gangrene.

**Diagnosis:**—The principal points in the diagnosis are the sudden onset, single initial chill with rapid development of high continued fever, rapid respiration with moderate pulse, facial herpes, sticky gray sputa soon becoming rusty, crepitation in first stage only, then dullness limited to one or more lobes, crisis followed by rale redux.

In acute phthisis the onset is gradual, with repeated chilliness, remittent or intermittent fever not ending in crisis, repeated night-sweats, no herpes, rapid loss of flesh, bloody purulent sputa containing elastic tissue and tubercle bacilli; it begins at the apex, a cavity follows consolidation, the other lung is invaded in time and tuberculosis follows elsewhere.



In typhoid fever there is no leucocytosis, the typhoid bacillus is to be found, and Widal's test is available; a drop of blood, if from a typhoid case, added to a pure culture of the typhoid bacillus, stops the movements of the bacilli and induces their collection into clumps.

In children meningitis may be taken for pneumonia; or more likely *vice versa*. Headache in pneumonia is frontal, in meningitis occipital, with stiff neck, restlessness, ugly temper, heightened reflexes and hyperesthesia, low variable fever, no crisis, pulse irregular.

**Prognosis:**—Pneumonia is more dangerous to the aged, alcoholic, debilitated and cachectic. Hemorrhagic cases are dangerous. Bad symptoms are the absence of leucocytosis, prolonged high temperature, rapidity and weakness of the pulse, early active delirium, prune-juice expectoration, implication of more than one lobe, and the presence of complications. Death generally occurs from heart-failure, due to overwork and sedation by the pneumotoxin. Severe collateral fluxion is a condition of imminent danger.

**Treatment:**—The treatment of pneumonia has been the battle-ground of centuries. Two diametrically opposite ideas as to the nature of the danger have led to the antagonistic principles of treatment by sedation and by stimulation. The ancient method consisted in a prompt venesection, followed by leeches, cups, cathartics, arterial sedatives, and calomel as an aplastic agent, with blisters and iodine to promote absorption following crisis. The modern expression of this theory is found in the administration of veratrum viride and aconitine, acetanilid, and local applications of cold.

The reaction against the antiphlogistic practice led to the stimulant treatment which has been urged with matchless force by Juergensen. Basing his argument on the mechanical difficulties of the circulation, he shows that every important element increases the work of the heart or subtracts from its power; and deduces a treatment by antipyretic doses of quinine, red wine, raw beef and cold baths. Petrescu gives digitalis by hundreds of grains, Wood relies on strychnine and cocaine, others on quinine, Bourbon whisky and other supposed stimulants. And as both parties support their theories by long lists of cases treated, with a notable scarcity of deaths, others drop all attempts at dominant therapeutics, concluding that such good results from discordant methods argue the comparative harmlessness of the disease; since, whichever is right, the patients of the others must recover in spite of the treatment.

But pneumonia is not a notably innocuous malady. Anders gives the mortality in hospitals as 25 per cent; in private practice 15, and quotes Wells' collection of 223,730 cases with a mortality of 18.1 per cent. Furthermore, it is to be observed that the results of expectant or nihilistic treat-

ment are not as good as those secured by the use of either stimulants or sedatives.

The Dosimetric Triad and Deferescent Compound are to be applied as described in the chapter on Treatment of Fevers; and the bowels to be kept clear and antiseptic.

This method of treatment has been put to the test of clinical trial by thousands of physicians, not those leaders whose mastery of the art would carry their patients through with almost any method, but the rank and file of the profession, in city and country alike. The results have been so satisfactory that we feel fully warranted in claiming that the average mortality in their hands is much less than reported by Wells. The system has the requisite flexibility, as it is suited to sthenic and asthenic forms alike, and can be changed from one to the other in a moment.

As collateral fluxion is one of the most serious conditions, it is well to accept the fact that a reduction of the bulk of the blood gives instant relief. Imminent danger of suffocation demands venesection, prompt and free enough to give a relief. Even if the loss of blood were to be felt severely in the later stages, the urgency of the present overweighs that consideration. But we have been too much under the influence of the reaction against blood-letting, and have ignored the ease with which such a loss is recouped by the body. Cases are exceptional in which the withdrawal of a quart of blood is seriously felt thereafter. The emergency may, however, be in some measure prevented by reducing the bulk of food, and thus the bulk of the blood. Let the food be highly concentrated and nutritious, easily digestible or predigested, with the smallest quantity of water. Thirst may be relieved by chewing gum, or by small pellets of ice, repeated not oftener than every half-hour. If left to himself the patient will want it every half-minute. Raw white of eggs, scraped beef or grated oysters, and the beef concentrations, with small portions of junket and fresh fruit-juices, constitute the best diet.

As a rule we prefer hot applications to the chest rather than cold. The hot mush-jacket, paste of mustard and hot molasses, hot larded flannels, "slap-jacks," etc., may sound crude to modern ears, but their efficacy is believed in by many excellent practitioners, and they are invariably declared to be a comfort by the patients. The best is a dry jacket of cotton batting. When hyperpyrexia is present we have been compelled to apply cold cloths, because there was no time for the action of antipyretics. Then use Anderson's method: Wring a towel out of ice-water, apply it to the chest, or better to the abdomen, and cover with dry flannels. In one minute whip off the towel and replace it with a fresh one. Repeat this for half an hour, making thirty changes, then cover with warm flannels



and leave an hour and a half, when, if the temperature is above 105°, repeat. We have kept up these half-hour applications of cold every two hours for five days, before the fever subsides enough to allow their discontinuance. The application is designed as a means of reducing the general fever rather than as a local remedy. It is far easier than the usual cold bath and fully as effective.

As the failure of the leucocytosis coincides with the worst prognosis, it is an interesting question if we should not induce leucocytosis by administering nuclein solution. The dose is a dram each twenty-four hours.

The temperature of the sick-room should be kept at 65, higher with children, and the patient must keep his bed as long as fever lasts. Care must be taken to avoid any emotion or exertion capable of throwing a strain on the heart. One of my own patients got out of bed, walked upstairs, and fell dead at the top step. "Heart-failure!"

Like many others, we began to treat pneumonia with whisky, gradually using less, and now for many years have used none. It is a delusion, and does nothing but harm.

This constitutes the treatment of pneumonia *per se*,—the "dominant" treatment. Certain symptoms and conditions demand the application of variant remedies.

The heart will not fail if the fever is kept down, the blood deprived of superfluous water, the alimentary canal aseptized, and the nutrition kept up. But the matter is so vital as to justify the routine administration of digitalin as advised, with strychnine when indicated, to prevent cardiac debility. The method of small and frequent dosage has only to be tried to convince one of its great superiority to Wood's method of giving strychnine in a full dose, gr. 1-20 every four hours; with over-stimulus as a result followed by depression, which is by no means obviated by alternating doses of cocaine. By the method recommended a minimum dose is repeated at short intervals until the experienced finger on the pulse shows that the point of "dose enough" has been reached, and then enough is given to exactly keep up that effect.

Of the remedies for collapse the best is the intravenous or subcutaneous injection of normal salt solution, one to three pints, repeated if necessary.

Respiratory failure may be met by adding atropine sulphate to the regular medicine, until the pupil begins to dilate, the skin to flush or the mouth to become dry. The inhalation of oxygen is indicated by cyanosis; continued and repeated simply as needed, without regard to the quantity used. As cyanosis is usually due to collateral fluxion in young adults, venesection is the remedy. But in the aged and very feeble, it is apt to be due to the retention of the secretions, the patient "drowning in his own



sputa" and it then calls for sanguinarine nitrate, gr. 1-20 every hour until relieved, with coffee and strychnine in full doses.

Nothing relieves the pleuritic pain so completely as a leech or cup applied over the painful spot. A blister is a poor substitute.

If cerebral symptoms are marked, elimination by the kidneys should be carefully maintained, with gelseminine, gr. 1-250 added to each dose of the regular medicine, and ice to the head if required.

Cough may require codeine and emetin, gr. 1-67 to 1-12 each, as needed, but is best relieved by inhalations of steam to soothe the inflamed tissues. Counter-irritants over the course of the pneumogastric nerve in the neck are also of great value. After the crisis, expectoration may be facilitated by emetine, ammonium iodide or scillitin, in small doses, with mildly stimulant liniments or hot salt rubs to the chest. Arsenic iodide, gr. 1-67 four times a day with calx iodata 10 grains a day, and one or two grains of iron iodide, form a very effective combination. The doses should be reduced as soon as the eyes become irritated. The writer believes the application of euophen in fluid petrolatum to the pulmonary tract with an oil atomizer, a useful means of hastening resolution and ridding the lungs of microorganisms. This may be employed several times daily. Care should be taken to destroy the sputa.

## SYPHILIS

Quite recently Schaudinn has announced the discovery of the *Spirochæta pallida* in syphilitic growths, and Siegel an entirely different organism, the *Cytorrhycles luis*. Professional opinion now credits the former with the causation of syphilis, although this remains to be proved. Whether all the varied phenomena of this malady are likewise to be explained by the direct action of this microorganism, alone, is another matter. Syphilis has not been transmitted to any animal except man, and recently the ape.

Infection occurs through sexual congress, accidentally by contact with infected persons or articles, or by heredity. The latter may be through a syphilitic father, though it is claimed such a man may beget a non-syphilitic child. There is a source of fallacy here that does not seem to have received sufficient attention. A woman may bear a syphilitic child, she showing no evidence of the disease, and yet remain immune against it thereafter. But if a woman is syphilitic she will bear infected children, the father being healthy; though as a rule either parent is most apt to infect the other in time, when the chances of fetal contamination are doubled. If the mother is infected after conception the infant may or may not be syphilitic.

**Anatomy:**—The chancre shows infiltration with small round cells, large epithelioid cells, giant cells, a few Lustgarten bacilli, thickening of the inner coats of the blood-vessels and alterations in the nerve fibers. The connected lymphatic glands are swollen and become indurated.

Among the numerous secondary lesions are skin affections, condylomata, mucous patches, eye diseases; in the tertiary we see gummata and arteritis. Gumma forming in the bones or periosteum is called a node. The size varies widely. If they reach the surface they break down. They contain a firm caseous substance surrounded by a fibrous wall. They may develop in any part of the body.

**The Chancre:**—The primary lesion first appears as a small papule, hard, like a shot beneath the skin, about a month after the infected congress. It is painless and apt to be overlooked, so that many patients fail to realize their misfortune until secondary symptoms develop. In a few days the tip of the nodule rubs off leaving a minute ulcer, still painless, secreting a trace of colorless serum. Meanwhile the connected lymphatic glands have swelled and are becoming hard, though not tender. There are no general symptoms. If suppuration occurs it is from secondary infection with pyogenic bacteria. If let alone the ulcer heals, leaving the nodule of cartilaginous consistence. The papule may be compound and form a patch with serpiginous ulceration resembling the track of a little worm.

Secondary manifestations commence in from six to twelve weeks from the appearance of the chancre. Sometimes they appear in a flamboyant manner with high fever, delirium, followed in a day or two by an outbreak of an eruption resembling smallpox at first. More frequently there is moderate fever, of any type, continuous, remittent or intermittent, that may persist until recognized and treated. A peculiar anemia frequently supervenes, the skin a dirty or earthy tint and odor, face sallow, eyes yellow. Sometimes part of this is due to the unskillful use of mercury, but more often it improves under this drug.

The skin affections of syphilis are known as syphilides. The first is a papular or macular eruption, not itching, appearing over the body and limbs, symmetrically, lasting a week and reappearing. The patient may not be aware of its existence until he strips for examination. The papules may appear in groups. Pustules may occur so like smallpox that these cases have been sent to the hospital as such—a mistake the writer once made. Squamous eruptions also appear, which are not confined to the extensor surfaces like psoriasis. These syphilides are multiform, and may present all the above types and others at the same time. There is a peculiar "coppery" color often seen about them.

Wherever the skin is moist, in the axillæ, perineum, groins, between the toes, at the margins of the mouth and anus, and along the inner surface of the labia, flat broad soft warts appear, known as condylomata. In the throat these are mucous patches. They are often preceded by hyperemia, and attended by swelling of the tonsils and salivary glands, and ulcers.

The hair may fall in patches, or generally thinning; and the nails may fall or develop onychia, sluggish, with coppery indurations.

White spots appear also on the tongue. Psoriasis is especially frequent on the palms and soles. Iritis occurs in three to six months, in both eyes successively. The severity usually is commensurate with the acuteness of the syphilides. Aural disease, parotitis, epididymitis and jaundice are sometimes present.

The lesions grouped as tertiary are not definitely separated from the secondary. They may occur after many years or early. The writer had one case of hemiplegia from a cerebral gumma occurring inside of a year from the first lesion. The syphilides of this period tend to ulceration, and the scars from rupia, scattered irregularly over the back, are diagnostic.

Gummata forming near a surface tend to break down and form sluggish deeply excavated ulcers; in the deeper tissues they form fibroid cicatrices. Much deformity results from the subsequent contraction. They are slightly infective.

Amyloid disease of the liver, spleen and kidneys often follows syphilis, but occurs also without it. Maladies frequently following syphilis yet not necessarily themselves specific are termed by Fournier parasymphilitic. Among them are locomotor ataxia, general paresis, arteriosclerosis, and some cases of epilepsy. A peculiar form of dyspepsia depends on syphilis, coming late. The writer has occasionally been baffled in his treatment of dyspepsia until perhaps accidentally the patient recollected having had a chancre; when a few doses of calomel were at once followed by marked improvement.

**Hereditary Syphilis:**—When born the infant may be wasted, skinny, weakened, like a withered old man; huge blisters or bullæ on some part of the surface, especially the palms or soles. Soon the "snuffles" begin, the lips ulcerate or cracks appear at the angles of the mouth or nose, the liver and spleen enlarge, and the epiphyses separate. Fatal bleeding at the navel is not uncommon.

These children die soon; in fact, they are often born dead. If the infection is less virulent the child may be born healthy in appearance, fattens well, and for some months retains the semblance of good nourishing. But snuffles have developed, resisting home treatment, ulceration occurs, the nasal septum necroses, letting down the bridge of the nose, and the



disease may spread to the ears and cause loss of hearing. The skin becomes sallow or earthy, and an eruption appears about the anus, of macules or flat plates; at any of the mucocutaneous junctures fissures or rhagades appear, whose secretion is very infectious. The hair and eyebrows may fall out; onychia is common; and the spleen and liver enlarge. The lymphatic glands do not show such marked and invariable induration as in acquired syphilis. The child is restless and its sleep disturbed; it may have difficulty in nursing, and hemorrhages may occur.

If the child does not die he is apt to recover showing the marks of the malady in his flattened nose and the aspect of premature age, with evidently impaired nutrition. The growth may be tardy, the forehead juts, and the skull is bumpy and lacks symmetry. The permanent upper central incisors are cupped at the cutting edges (Hutchinson teeth).

Keratitis may occur at puberty or be delayed till the 30th year. The corneas seem clouded and sight is blurred. Iritis may also appear then. Sudden and permanent deafness may accompany the disease. Nodes may form on the bones, especially tibial; joint lesions, gummata developing in the brain or internal organs, or about the vulva, and many other manifestations of this malady have been recorded. Fecal incontinence occurred in one of the writer's cases, and persisted till the 12th year; when it was cured by mercury and enemas.

Osler has never met even an suspicious case pointing to transmission of syphilis to the third generation.

**Syphilis of the Internal Organs:**—Gummata form in the brain, of all sizes up to a walnut. They are usually attached to the pia or dura, are often multiple, and become caseous. Less frequently they form in the spinal cord. Meningitis, subacute or chronic, occurs in connection with gummata. The coats of arteries are thickened. Sclerotic masses also form in the nerve-tissues, with areas of softening connected. Apoplectic effusions occur from the diseased vessels. Nerve syphilis is more frequent after acquired forms. It may occur after 30 years, or within three months of the chancre and during secondary manifestations (Lydston).

The symptoms of cerebral syphilis are, loss of memory, change in disposition, headache, sudden maniacal delirium or convulsions. More frequently there is headache, vertigo or mental excitement, followed by an epileptoid convulsion leaving hemiplegia, or long-continued torpor. Syphilis causes general paresis or it prepares the way for it, since in a number of instances the connection has been noted. Finally, the symptoms may be those of cerebral tumors, headache, optic neuritis, cerebral vomiting and convulsions. A convulsion first occurring in a person over 30 years of age is most probably syphilitic, if not febrile or dependent on some other obvious cause.

**Diagnosis:**—The history is important. Search is to be made for induration or scars from the chancre and hardened inguinal glands, for scars of rupia on the back and of pharyngeal ulcers, nodes on the shins, and other specific lesions. The symptoms are multiform, varying, and not defined as they would be if due to any of the known affections of the part; they also improve notably on antisyphilitic remedies.

Pulmonary syphilis is very rare. It occurs as white pneumonia of the fetus, gummata, or as fibrous interstitial pneumonia (Virchow). The existence of syphilitic phthisis has not been proved.

Syphilis of the liver occurs as diffuse hepatitis, gummata, and as a thickening of Glisson's capsule, hyperplasia of the connective tissue. Jaundice is present sometimes in infants, while in adults we see the symptoms of cirrhosis, anemia with albuminuria and dropsy (amyloid disease), or the tumor formed by a large gumma. The diagnosis depends on the history of syphilis, with irregular enlargement of the liver and good general health.

Syphilis of the esophagus is rare, of the stomach still rarer. The small intestine and the cecum sometimes suffer, but far more frequently the malady is found in the rectum. Gummata develop above the internal sphincter, in women especially; causing obstruction by cicatrization.

Cardiac syphilis appears as gummata, fibroid and amyloid degenerations and endarteritis obliterans. The latter appears in the arteries and also as gummatous periarteritis. The causation of arteriosclerosis and aneurisms includes syphilis.

In the kidneys we find gummata, acute nephritis, rarely leaving chronic nephritis in its wake. Orchitis is of diagnostic importance; gummatous and interstitial

**Diagnosis:**—Many patients do not know they have acquired syphilis; many more lie about it, even to the physician they have called upon for treatment. The cardinal points are the history, the indurations of chancre or inguinal glands, the remains of eruptions symmetrical, multiform, non-itching, mucous patches in the throat, white patches on the tongue, condylomata in deep corners and about the mucocutaneous margins, fissures at the corners of mouth and nose, tender shins, nocturnal rheumatism, palmar or solar psoriasis, scars from rupia on the trunk, areas of alopecia, onychia, loss of nasal septum, induration of the middle cervical glands and one at the bend of the elbow, the coppery hue of lesions, atrophy or indurations of the testes, nodes, and in women frequent miscarriages. In infants the bullæ found at birth, snuffles, rhagades, rashes, facies and later keratitis, with the Hutchinson teeth, are characteristic. The cachexia is corroborative; the effect of antisyphilitic drugs above what would be

evident in other causes, is also of value. But potassium iodide is curative in many other than specific maladies. The occurrence of convulsions for the first time in a man over 30, should lead to inquiry as to early syphilis. Loss of the nasal septum and sinking of the bridge are to be considered syphilitic until proved the contrary. The diagnosis is not usually difficult when it occurs to the doctor that he may be dealing with this disease—when he awakes to the possibility of it, he will find the trail of this old serpent in many a place apparently beyond the reach of suspicion.

**Prophylaxis:**—This will include the physiologic education of the public and its instruction in personal hygiene. Few if any men or women can be hurt by continence or the limitation of sexual intercourse within legal limits. As marriage at an early period becomes less desirable it is wise to teach the young that they can prevent the development and cultivation of the sexual passions by keeping mind and body healthily employed. The devotee of athletics has little taste for concupiscence except as forced on him; the man whose mind is occupied by the weighty problems of life forgets the calls of sex. The danger lies with the weakling of either sex, who lolls on a sofa with books, pictures, thoughts and conversation pervaded by sexuality. The cultivation of true manliness and womanhood elevates the individual to a plane in which the animal propensities become dormant or at least controllable.

Until such education becomes universal we who must deal with the thing that is and not with an untrue and impossible ideal, which has never existed since man began, must advocate legal control of the social evil, by which innocent persons may be protected. For the sins of the syphilitic are not confined to himself, but the wife and the unborn babe suffer; his associates and those who unwittingly come in contact with his discharges are infected. For this reason it is well to establish as close a supervision as possible over prostitutes, to insist on frequent examinations, to send the diseased to Lock hospitals and keep them there till cured—and the first requisite for this is to contrive to take away the dread these people have of such institutions.

Persons affected with syphilis must be warned of the danger of contagion from their discharges, and the most scrupulous care taken to prevent the infection of others from towels, pipes, clothes, cups, kisses and other ways. The writer's observations have convinced him that such infections are far more frequent than the textbooks teach.

Stricter supervision should be exercised over nurses and those who have the care of children. A wealthy and prominent family engaged as child nurse a woman who applied, without much inquiry. A few weeks later she fell in a convulsion, and the writer found unquestionable evidences of



syphilis and rhagades that might easily have infected her nursling. The writer has also traced infection to a medicine spoon, a cup used for drinking in a printing office, a borrowed pair of trousers, a lent nightgown, etc. A mother was infected by the dressings from her son's lesions. A syphilitic infant infected its wet nurse; and *vice versa*. A gynecologist was infected by a woman he was examining and lost his life from cerebral syphilis developing within the year. It is no legitimate argument in favor of leaving prophylaxis to moral sentiment to say that these are the consequences of sin, for they fall on the innocent, who should be protected by law. The greatest difficulty in moral protection lies in the remarkable indifference of the syphilitic as to his obligation to protect others. In fact, loss of the sense of moral responsibility is noted by many syphilographers as a result of the disease.

**Treatment:**—The reason syphilis is not more frequently cured is the incompetence of the physician. We carelessly make use of the striking epigrams of Holmes and other "illustrious physicians." We know enough to discount them; but to the patient they are oracular. With therapeutic nihilism the fashion, with fetching sneers at drugs on the lips of every "scientific" product of the modern schools of Germany, there is little wonder that as soon as suffering has ceased and visible evidences of the disease have disappeared, the patient quits his physician and only returns when driven by a fresh outbreak. Thus syphilis is indeed incurable; when in truth it is one of the most manageable of diseases.

The writer has several times seen syphilis before the ulcer, when after an undoubtedly impure connection there had developed a hard papule on the penis, with as yet no enlargement of the inguinal lymphatic glands. The papule was excised and no further symptoms followed. Such results do not always follow, but since they may do so, they are well worth trying for.

Otherwise there is little treatment for the local sore, except to dust it with calomel and protect it from dirt and abrasion by suitable dressings.

The moment the diagnosis of syphilis is made the patient should be put on mercury. It makes no special difference what preparation is used provided it be given in the most effective manner. For this purpose it is necessary that the physician and patient should comprehend the correct theory of its action.

Mercury in small doses stimulates excretion. Pushed to saturation and till toxic action commences, it causes breaking down of the feeble cell-structures, and if pushed will destroy normal cells. The specific cause of syphilis resides in certain structures already described, indurations, warts, patches, hyperplastic areas, gummata, etc. Under the influence of the

disease these tissues tend to spontaneous necrosis, so that their breaking down is a part of the history of the case. Since there is this evidence of enfeebled vitality in syphilitic tissues, we find that under the influence of mercury they melt down and are absorbed under smaller doses than are required to cause the destruction of normal tissues. It is therefore our quest to find how much mercury our patient can bear, to get the utmost possible effect on the disease, without quite reaching the dose that will act on the normal tissues.

Begin with mercury biniodide, give gr. 3-67 four times a day; add one daily dose every four days, till the first evidence of toxic effect is manifested—soreness of the teeth or a feeling as if one or more were too long—then drop one daily dose and keep right on. After a time the dose may be again cautiously increased, or it may be necessary to lessen it.

The essential point is that the remedy shall not be intermitted a day. The occurrence of salivation is a disaster, but with care it need not be permitted. The use of the tooth-brush, with mild antiseptic washes for the mouth, will prevent such trouble.

How long shall mercury be continued? As long as there is the slightest sign of the disease remaining, and for three months longer. Then stop, but as soon as any signs of the malady reappear resume the drug and continue it as before. By this means every vestige of the disease may be eradicated within two years; and the patient may be permitted to marry, with a clear conscience. Of course the couple must be kept under supervision, especially if pregnancy results; and the wife be dosed with mercury if there is any sign of the disease. The child must also be held under observation till three months have passed without any development. But although the writer has anxiously examined his patients for many years afterwards, and watched for evidences of the malady in their children, he has never known a case where the foregoing treatment has failed to eradicate the disease.

In the prognosis a line must be drawn between the disease and its results. We can stop the ravages of syphilis but we cannot always restore tissues to their former condition. If the nasal septum is dead it will come away, despite mercury. If fibers of the brain have been rent asunder by a forming gumma we cannot bind them together and renew broken connections. When the conflagration has been extinguished the building may not be in a condition for repairs. Let the patient comprehend this, and there will be less dissatisfaction at the end.

What effect has this mercurial course on the general health? A well man could not take it with impunity, but we are dealing with a sick man, a poisoned man; and poison and antidote neutralize each other marvelously. Under this destructive agent the patient picks up, improves in health, looks

and strength, and even puts on flesh. All the faculties of body and mind are powerfully stimulated. His emunctories work with feverish rapidity; he eats four times a day, enormously, and yet is always hungry; the debris of his former life is cleared out from his system and there is an indescribable sense of newness, of rebirth, so that as one expressed it he is even "purged of original sin." The mental faculties are likewise active and the sexual powers may be stimulated. He is living fast, and at high pressure. The red blood-cells multiply and gain hemoglobin.

The writer does not believe in the curative power of potassium iodide. It is customary to place it by the side of mercury as another remedy for syphilis, but its value is slight. Syphilitic manifestations subside under it, less rapidly than under mercury, but the effect is not permanent. It is the custom to give the iodide in huge doses, up to an ounce even in a day, in case of such sudden emergencies as cerebral syphilis when haste is requisite to prevent damage to the delicate nervous tissues. But there is a better and quicker means of accomplishing this object. Add to each dose of mercury biniiodide of gr. 3-67, half a grain of iodoform and gr. 1-67 of arsenic iodide; and you will have a combination that for efficacy and speed in getting to work will far exceed iodide of potassium. If glandular induration is to be dissolved add to the above phytolaccin, half a grain to each dose; and the efficacy will be enhanced.

There are many preparations of mercury; and there are other methods of administration—fumigation, inunction, etc. If one feels it incumbent on him to do something different from other physicians, to play for the galleries, he can find in these his material; but as for efficacy there is nothing in these disagreeable and filthy methods more than the usual stomach administration. There is more to say in favor of the hypodermic use of mercury; calomel in suspension by this method seems to be absorbed slowly but continuously, and to exert a most surprising effect when compared to the doses. Once a week is sufficient. But by no method can dosage to effect be regulated so accurately as when drugs are given by the stomach.

When any lesion is within the reach of local treatment, as in many of the skin diseases, we may with advantage apply mercurials there as well as internally.

Some persons cannot take mercury; their tissues respond so strongly to its destructive power that even in small doses it does harm rather than good. Here there is an inherent weakness in the construction of cells that must be remedied. We may give them calx iodata, adding arsenic iodide, with iron iodide if anemia is present, which is not always the case; and from these remedies we get an excellent effect. Here also we may substitute the vegetable resolvents—stillingin, etc.—for mercury, with great



benefit. As the latter is given for its specific antidotal power there is nothing to hinder the simultaneous use of any tonics or other remedies that may be indicated by the peculiar conditions present in any case. Failure to comprehend this is one reason for the preference of potassium iodide in tertiary cases, where tonics are usually required.

In congenital syphilis it may be convenient to employ mercurial ointment smeared on a flannel bandage and applied about the waist. The writer's preference is for mercury with chalk, by the stomach.

We are aware that the prognosis we have given as to the complete cure of syphilis is more favorable than the textbooks warrant. But we have been in the habit of adhering to the radical treatment described, and of knowing that it was carried out as directed, and from such methods results are obtained.

## LEPROSY

The dread with which this malady is regarded is a relic of the importance attached to it by the ancient Hebrews. So great was their terror of it that Berosus accounted for it by declaring the Hebrew race was derived from lepers gathered and expelled from Egypt by the Pharaohs. Modern researches show that a number of skin diseases were included under the name of leprosy in Bible descriptions, and that while contagious it is far less so than almost any other contagious disease, and infinitely less to be dreaded than tuberculosis.

Leprosy exists at present in the Acadian districts of Louisiana where over 100 cases are known; among the Chinese in California and there it has attacked some whites; in the Norwegians in Minnesota where it is decreasing and is not known to have attacked natives; and among the descendants of the French in Nova Scotia and New Brunswick. Scattered cases, usually Chinese, are discovered occasionally in the great cities. It occurs throughout the West Indies, in Brazil, many cases in Hawaii, but its principal habitation is in the crowded empires of Asia where cases are numbered by hundreds of thousands. Hence it spreads to every land that admits the Chinese.

The cause of leprosy is a specific bacillus discovered by Hansen. It bears some resemblance to the tubercle bacillus.

Leprosy is probably inoculable. Heredity simply offers opportunities for contagion, which is the principal method of transmission. The bacilli are given off in saliva, expectoration, nasal mucus, urine and milk; and have been found in dust of rooms occupied by lepers. The bacilli are believed to enter the body through the skin and mucosa. The number of

laundresses affected indicates transmission by clothing. Hutchinson believed that the use of fish predisposed to leprosy, as certain districts in Spain are affected where the use of fish is common; but as this comes from Norwegian fisheries it may be an instance of bacillus transmission.

Contagion is slight; there is little possibility of nurses and physicians becoming affected; but those who live with lepers tend in the course of years to become leprosy. When lepers are segregated there is a slow but continuous decrease in the number of cases; when allowed to go about freely there is a slow but steady increase.

**Anatomy:**—The tubercles of leprosy consist of connective stroma with granulomatous cells in the reticular spaces; vast numbers of bacilli in and about the cells; spreading, the center of patches ulcerating and cicatrizing, and involving the skin and accessible mucosa. Toes and fingers are severed, and great deformity results from cicatrization. In the anesthetic variety bacilli settle in nerve trunks, the cutaneous areas supplied becoming white and numb.

**Symptoms:**—Sharply defined and hyperesthetic areas of erythema appear on the surface of the body, becoming pigmented; then the patches become numb and white, or sluggish nodules form, which gradually spread at the edges and ulcerate in the center. The hair falls, the eyes, mouth and larynx are attacked, and death may result from implication of the lungs. The anesthetic form begins with pains in the limbs, areas becoming hyperesthetic or anesthetic, blisters form, pigmented patches appear and fade leaving numbness, ulcers follow the blisters with subsequent cicatricial deformity, and the termini of toes and fingers are dropped. The course is very slow.

**Diagnosis:**—Dusky erythematous patches, hyperesthetic or anesthetic, are characteristic. The fully developed disease can scarcely be mistaken. Lupus leaves cicatrices behind its slowly advancing nodules but the area is not anesthetic. Examination of the nerve trunks with the microscope will settle any doubtful case.

**Treatment:**—Dyer reports cures from the use of Calmette's antivenene; but these had not when reported stood the test of time. Chaulmoogra oil has proved curative in Japan. It must be given in doses pushed to 700 drops a day and continued many months. But it, like wintergreen oil for rheumatism, soon becomes so nauseating that it is difficult to induce the patient to continue it.

Does this oil, like cod-liver oil, depend on one or more active principles that can be extracted, like morrhual, or does it like oil of wintergreen depend on the peculiar acid it contains—gynocardic? In either case the separation of the oil and rejection of the useless part would solve this question, as the



separation of salicylic acid did in the case of wintergreen, and enable us to utilize this remedy to its fullest power. This question seems to be left for the enterprise of coming generations. As separation of the leprous from the rest of the population, in lazarettos, is followed by cessation of the spread of this malady to new subjects, it should be enforced as strictly as possible. It seems necessary that the condition of lepers shall be made more comfortable than at present, however, to remove their disinclination to segregation, that now leads to concealment of patients until they have transmitted the infection to associates.

## TUBERCULOSIS

**Etiology:**—In 1881 Robert Koch discovered the true cause of the disease, the tubercle bacillus. This discovery was foretold by Niemeyer, who described clearly the symptoms and lesions of phthisis before and after the advent of the bacillar invasion. His views have been verified by the observations made in our thirty-five years' clinical studies; and though at present not held by the leading teachers, we expect to see them confirmed before many years, and to see the profession swing back to the level of his teachings. At present the bacillus has carried the pendulum too far to one side.

We have indulged in a little prediction ourselves; and, as we claimed over ten years ago, it has been found that the tubercle bacillus does not monopolize the destruction of the human lung. In examining sputa at the laboratory we find tubercle bacilli, pneumococci, influenza bacilli, strepto-, staphylo-, and gono-cocci, and sometimes typhoid bacilli, variously combined. Until we are able to differentiate the effects of these organisms we must treat of phthisis as a simply tubercular or as a mixed infection.

Phthisis prevails in every inhabited country of the globe, from the poles to the equator. It is most prevalent when the population is crowded, poor and dirty; less frequent as we approach the poles or ascend above the sea-level, for the simple reason that population there becomes sparser. Statistics showing less prevalence of this malady at 5,000 feet above the sea-level, and almost a total absence of it at 10,000 feet elevation, must be read with the knowledge that the vast bulk of the world's inhabitants live less than 5,000 feet above the sea-level, and very few above 10,000 feet. If among the few scattered thousands, out of a billion and a half, there are still some tuberculous individuals, it speaks strongly for the universality of this dreaded microbe. There are reasons, however, for some degree of immunity in mountaineers. The thin air causes unusual development of the lungs, as their swelling chests testify; the pure air is free from



bacteria, and the sparse population renders successive infections unlikely. The outdoor life, the rude exercise, the absence of city dissipations, conduce to health in those not killed off by the privations.

**Pathology:**—While the lung is most frequently the seat of tuberculosis, it may affect any other part, the order of frequency being the larynx, intestines, peritoneum, genitourinary apparatus and brain; in children the lymphatic glands, intestines, bones and joints. Sooner or later, the malady attacks the lungs, also. The entrance of the tubercle bacillus into lung-tissue is followed by proliferation of the connective tissue and epithelium, formation of giant cells and influx of leucocytes, both possibly for phagocytic defense. Tubercles measure 1-2 to 3 mm. in diameter, are at first transparent and non-vascular. A netting of connective tissue surrounds the tubercle and shuts it off more or less effectually from the surrounding tissues. The tubercle undergoes either caseation or sclerosis. In the former case the cells become yellowish, amorphous, growing at the margins till they unite in masses. These either soften and break down into cavities, or are encapsulated, the cheesy contents becoming chalky, the tubercular process extinct.

In sclerosis hyaline transformation of the mass occurs with the formation of fibrous tissue, the process extending into the surrounding pulmonary structures. Contraction follows as in other cirrhotic affections. Caseation and sclerosis often coexist. Calcification and sclerosis are evidences of cure, of the body's success in the battle with the invading bacilli. If the invaders are few and the body well-supplied with the phagocytic leucocytes, producing the defensive proteids in abundance, the victory goes to the defense. The processes may be confined to one or a few points, or may involve a lobe, a lung, or both lungs.

Surrounding the tubercle is a zone of inflammation caused by it, in which fibrosis occurs. Into this the bacilli may penetrate, extending the disease process, or it may become circumscribed, checked or even extinguished. Sometimes the first focus is thus cut off, and in it the bacilli remain, quiet but alive, until at some time, perhaps after years, circumstances allow their egress into the lung or other parts of the body and the fight is resumed. Various bacteria unite in the struggle, causing destruction of lung-tissue, fever, hectic, sepsis, etc.

Koch's bacillus is a curved rod, in length one-third to one-half the diameter of a red blood-corpuscle, the ends rounded, non-motile, with spots representing vacuoles. Stained bacilli have a beady appearance. They are best grown in blood-serum, at a temperature between 98 and 100° F. Heat the serum till coagulated; on cooling rub on it the cut surface of a bit of tuberculous tissue, leaving it on the surface. In two

weeks appear colonies of dry grayish scales. If with these guinea-pigs are inoculated tubercles appear in about three weeks. From cultures an albuminoid substance has been extracted, which causes fever when injected into the body. It is a nuclear proteid, not a toxin. A ptomain and extract have also been separated. Part of the symptoms are due to the production of these toxins. Outside of the body the bacilli live an unknown period, withstanding extreme cold, water or dryness, but killed by a few minutes' boiling or by exposure to the sun's rays. They are believed to be incapable of reproduction except in an animal body.

The liability to tuberculosis is great in those who change from an open air to house-habitation. The Indians who leave their tepees for houses die off rapidly of tuberculosis.

Those who have recovered their health by a life in the open air will find it trebly perilous to return to living within six walls. Better is it that they recognize their loss of resisting power and continue the habits and the *milieu* to which they owe their recovery.

Tuberculosis is usually acquired through air inhaled. Infected men and animals give off bacilli in coughing, sneezing, talking and laughing. Food is thus frequently infected. Transmission is less frequent from man to man than from an infected dwelling. This has been shown by Flick's studies of the prevalence of the malady in Philadelphia, where centers of infection were proved. Numerous cases are also recorded of obvious direct transmission. Transmission also occurs from the milk or flesh of tuberculous animals, or from food infected by tuberculous discharges, in dust, etc. The non-tuberculous portions of a tuberculous animal do not carry infection. Flies probably carry bacilli on their feet to food. Inoculation may transmit the disease, as by the bite of a consumptive, handling infected foods, dissection wounds, abrasions on laundress' hands, etc. The bacillus having been found in the fetus, we must admit the possibility of direct heredity, but usually it is only the morbid susceptibility to the malady that is so transmitted.

The negro is more liable to tuberculosis than the white, the Indian more than the negro. Children of consumptives are more liable, and more exposed to direct infection. Many other infections like measles predispose to tubercle. Most cases develop between the ages of 20 and 30 years. All ages are liable. Females are slightly more frequently affected, especially during pregnancy. Humidity and variable weather favor its occurrence, and it is rendered less prevalent by draining marshes and ventilating dwellings. Among local causes may be mentioned occupations involving the inhalation of dust, the occurrence of bronchitis, pneumonia, hemoptysis, pleurisy, pulmonary artery stenosis, thoracic trauma, or tumor.



All morbid influences that impair the structure or weaken the vitality of the lung tissues, open the door to tubercular infection.

### ADENITIS

This form of tuberculosis occurs in children and young adults. The infection is less virulent than in other forms. It may be local or general. The cervical glands are most frequently affected. Bacilli constantly fall on the nasopharyngeal mucosa, and if vitality has been lowered by catarrh the intruders may reach the glands. The primary infection may be in the tonsils or the teeth. Cutaneous wounds or eczema may offer an open door. Formad found in "scrofulous" persons that the perivascular lymph-spaces were more or less occluded by granular debris, hindering the free ingress of leucocytes, and affording a secure refuge for invading bacilli. The glands enlarge, first the submaxillary, even to the size of an egg; as suppuration occurs the skin becomes adherent and if let alone they discharge externally. Fever, anemia and emaciation may attend. The whole chain of cervical glands may enlarge, forming a solid mass extending from ear to ear. The axillary and bronchial glands may be involved. The diagnosis may be made by the enlargement and by the tuberculin test. Tubercle bacilli may be found in the pus. The course is tedious, mostly ending in recovery.

The bronchial glands may be affected primarily or following pulmonary tuberculosis. Caseation occurs, ending in abscess or calcification. If they open into the air-passages cough results with discharge of pus, blood and debris of the disintegrating tissue. The lung may be thus infected from glands long quiescent; or the pericardium may be invaded.

The mesenteric glands may be affected primarily or secondarily to intestinal infection. Local pain and tenderness follow the peritoneal involvement, with effusion. The nodules may be felt. The diarrhea is due to intestinal ulceration, tubercular. Fever eats up the fat, and causes anemia and debility. The diagnosis is not difficult. The malady occurs in children.

Rarely there is a general tubercular adenitis without other involvement. The fever is remittent or intermittent, wasting rapid, the strength failing fast, and the enlarged glands may be palpated. The malady is chronic, unless suppuration occurs.

We must not conclude that all the enlarged glands are necessarily tuberculous. The writer had one case in which the cervical glands were swollen into a mass from ear to ear; he opened the coverings and found five glands were yellow with suppuration; these were removed, when the swelling of the rest promptly subsided and in a very short time there was scarcely a trace of the disease remaining.



Whenever the malady is within reach—and what part of the human frame is beyond the modern surgeon's knife?—the diseased glands should be enucleated and removed without opening them. The treatment then is that of tuberculosis in general. Carious teeth are probably the most frequent avenue for the entrance of tubercle bacilli in this malady, and prophylaxis would suggest having the primary teeth filled whenever decay begins in them.

## ACUTE TUBERCULOSIS

In this disease there may be an acute general infection of many or all the organs of the body, with development of miliary tubercles. An old focus has probably discharged into the circulation. The lungs, liver and spleen are most affected. This is more frequent in early life, the original focus being in the lymphatic glands, lungs or kidneys. It may follow measles, whooping-cough, typhoid fever, influenza or pneumonia. Miliary tubercles may exist in many parts of the body and cause no appreciable symptoms. They have been detected in the choroid.

In the typhoid form the symptoms begin with prodromes of malaise, headache, chilliness, fever and growing debility, or abruptly with high fever, weak, rapid pulse and mental sluggishness or delirium. The tongue is brown and dry, respiration rapid, with cyanosis and pallor. The hectic flush accompanies the fever acme daily. Epistaxis is not common. Prostration follows the fever, *pari passu*. Wasting is so marked as to be diagnostic. Nervous symptoms are less prominent. The pulse is rapid as compared with fever, irregular if the meninges are affected. There is little cough, but breathing is hurried and labored; little expectoration, not tubercular unless an old lesion is present and discharging. The physical signs are those of any disease present. The appetite is lost, nausea may occur, and thirst is marked. The spleen is slightly enlarged. Tubercles may be found in the choroid by the ophthalmoscope.

The diagnosis from typhoid is based on the history, evolution, fever chart, rapidity of pulse relative to fever, rapid breathing, dusky pale face, absence of abdominal symptoms and rash, of Widal reaction and knee-jerk, rarity of epistaxis or intestinal hemorrhage, and the presence of tubercles in the choroid and tubercle bacilli in the blood.

The pulmonary form may develop suddenly, with chill, followed by fever, or after a period of failing health, acute infections like measles frequently preceding the outbreak. Dyspnea, rapid breathing and other evidences of pulmonary implication occur early and decidedly. Cough

is prominent. General symptoms resemble those of the typhoid form. Bronchopneumonia is manifest. fever high, pulse fast and irregular, nervous symptoms not marked. The course is longer than general miliary tuberculosis except in children. Suffocative phenomena increase and cause death. The diagnosis is made by the history, the bacilli in the sputa or the blood, sometimes in the choroid, and by the gravity of the general symptoms.

### TUBERCULAR MENINGITIS

Tubercular meningitis is frequent, occurring at any age but mostly between two and seven years. The infection is usually from bronchial glands, a fall often preceding the outbreak, and it is sometimes associated with erythema nodosum.

The pia at the base of the brain is usually the seat of the tubercular deposit in children, the vertex in adults. The membrane is inflamed in the former, less frequently in adults. The exudate is gray, transparent and gelatinous, with few or many tubercles enmeshed. They may be found in the arteries when not elsewhere. The cerebral convolutions are flattened by pressure, the cortex softened, red, rarely white.

During a week of prodromes the child is peevish, pale, complains of headache and photophobia, and grinds its teeth in sleep. The tongue is coated, appetite absent, vomiting, propulsive or regurgitative, bowels constipated. The urine may be scanty, the abdomen sensitive. Wasting begins at once. Rarely the onset is acute, with excitement. The invasion is gradual or sudden, with severe vomiting, chills followed by fever, and headache. The irritability is extreme, with screaming, sometimes early drowsiness. The attack may commence with convulsions, wild delirium, paralysis or coma. The headache is increased by light, sound or motion; the hydrocephalic cry is given, vertigo is present, the pupils contract, the face pales and flushes, the expression is sad or dull, and the mind may wander. The *tache cerebrale* may be manifested. Vomiting does not depend on gastric conditions. Sleep is disturbed by starting, fever is moderate, rising toward evening. The skin is dry and harsh, the pupils dilate and expand irregularly, ptosis appears early. The pulse is at first relatively slow, becoming faster and irregular.

In the stage of transition the patient quiets some, is duller, cries less, vomits less, complains less, the abdomen is boat-shaped, the head retracted, constipation obstinate; strabismus, ptosis and palsies of various nature indicate local foci forming. There may be tremors, general convulsions or athetoid movements. As pressure supervenes the pupils dilate. Respiration is irregular and sighing.



In the paralytic stage the patient becomes duller, comatose, local or general spasms occur, optic neuritis develops, ocular palsies increase, the pupils dilate, the eyes are half closed and the balls may oscillate, and local paralyses develop. The temperature becomes subnormal, but is hyperpyretic just before death, the pulse fast, weak and irregular, with anesthesia and muscular relaxation. The typhoid state may develop before death. Leucocytosis may occur. The optic disk is hyperemic, swelling and striation follow, and choroid tubercles may be detected.

The diagnosis is made by the ophthalmoscope, the tuberculin test, and lumbar puncture to distinguish from cerebrospinal fever. Syphilis and traumatic meningitis are to be excluded.

The type may be mild, malignant or chronic. Acute cases end within a month, chronic ones last several months. Remissions may occur. Some cases are known to have ended in recovery.

The older treatments having failed, the way is open for trying the newer methods and remedies.

### ACUTE PHTHISIS

Acute forms of phthisis may be either tubercular or nontubercular. Of the latter form the following case may serve as an example: The superintendent of a cemetery, a young man of slender build but healthy in person and habits. The body of a woman dead of "consumption" had been placed in a vault. When the vault was opened it was found that the body, which had been enormously swollen at death, had burst and the fluids had covered the floor of the vault. The stench was so great that the employees, though accustomed to such work, refused to enter the vault. Phenol in large quantities was thrown in, and the superintendent to set an example entered first, and remained for some time until the cleaning was done. He was seized with shivering, followed by high fever, violent cough, the sputa remaining liquid after 48 hours from the time they were ejected. The temperature was 105° F. and over, night-sweats came on, with rapid failure of strength and emaciation, but a remarkable absence of the concomitant symptoms, as the man scarcely kept his bed. The sputa was thin, copious, serous, and pronounced by the bacteriologist to consist of a pure-culture of "bacterium termo," there being no tubercle bacilli. For several days the patient exhaled the odor of phenol and the urine became dark.

He improved somewhat and was sent to San Antonio, Texas, where he resided for some years, recovering entirely, according to his own report ten years later.



In 1869 a man was brought into the clinic at Charity Hospital, Cleveland, with the diagnosis of acute phthisis. This was questioned by that fine diagnostician, Prof. Scott, on the ground of insufficient evidence. The only symptoms were fever of 104° F., rapid respiration, slight cough, and a sensation of oppression in the chest, with just enough gastrointestinal irritation to arouse the suspicion of typhoid fever. The patient died in four days, and at the autopsy his lungs were literally stuffed with miliary tubercles, in phenomenal numbers, there being not a spot where a pencil-point could be put that was free. Prof. Scott dwelt on the fact that there had been no dullness on percussion.

Four robust, healthy Irishmen, engaged in the particularly healthful occupation of peddling coal about the streets of the city, slept in a room so small that their two beds and a wash-stand filled all but just enough room to open the door, so that they had to climb into bed over the foot-board. One contracted tuberculosis, and lived about three months. The second to be attacked was likewise affected, and died in six weeks. The third was seized while these two were still occupying the room, and he died in four days. The autopsy showed a condition of the lungs closely similar to that of Dr. Scott's patient as detailed above. Here we have all the conditions necessary for the most virulent infection, these illiterate men being confined in a very small room, with no ventilation, spitting on the walls and bedding until the air was saturated with the bacilli.

Several cases of acute tubercular phthisis came under our observation in a paper-box factory. Many girls worked closely crowded in one room, the windows usually closed because the drafts interfered with the gas-jets employed to keep the glue-pots warm. Some among these girls were always consumptive, and the contagion was thus transmitted in concentrated form. The course was from six to twelve weeks.

The malady may simulate lobar pneumonia, or in children bronchopneumonia. The course may be acute or subacute.

**Symptoms:**—The onset is sometimes marked by a chill resembling that of pneumonia, or by a period of depressed health, with dyspnea, bronchial hemorrhage, hard dry cough, fever running very high, rapid wasting, hurried breathing, anorexia, constipation, night-sweats, and inability to breathe comfortably while lying down. The face has a curious smoky look sometimes, or there may be cyanosis. As the malady advances there are symptoms of general bronchopneumonia, crepitus, slight dullness or increased resonance, the patient complaining of a stuffy sensation in the chest. The pulse is rapid and weak. The fever in very acute cases is apt to exceed 105. Epistaxis sometimes occurs. Debility and wasting progress rapidly. Delirium and other nervous phenomena depend upon the fever present.

The diagnosis is often difficult, but the hurry of respiration, rapid development of the fever and its height, cyanosis and other evidences of pulmonary involvement, without physical signs of pneumonia or the abdominal symptoms of typhoid fever, usually indicate the malady, which is confirmed by the presence of numerous tubercle bacilli in the sputa. Examination of the blood shows leucocytosis only if suppuration is going on. Tubercles may be detected in the choroid.

In less acute cases the examination of the sputa for bacilli may be the only means of surely diagnosing the tubercular affection from various pulmonary inflammations. A whole single lobe may be involved in the tubercular affection, the course simulating that of pneumonia with missed crisis. Bronchial hemorrhages more frequently are followed by subacute than by hyperacute attacks. The sputa is usually thin and serous, and if ejected upon a handkerchief remains liquid instead of drying up. If bronchial hemorrhage occurs the sputa thereafter contains blood or its debris, with the mucus and pus supplied by the consequent inflammation. The physical signs are those due to consolidation of the lung-tissues, and the presence of secretion, varying with its quantity, consistency and location. Death usually occurs before there has been time for consolidation or cavity formation. As usual in tuberculosis, the patient is hopeful to the last. If the case is prolonged till a cavity has formed the sputa contains elastic fibers from the disintegrating lung-tissues. Hemoptysis may occur towards the last from erosion of an artery, and may be fatal.

**Prognosis:**—The prognosis is bad if the lung is universally affected, the sputa swarming with tubercle bacilli or streptococci, the course rapid, the fever persistently high, and if hemorrhage from erosion occurs. Niemeyer did not consider non-tubercular "galloping consumption" necessarily fatal, and McCall Anderson reported cures. Our two cases of non-tubercular bronchopulmonary mycosis recovered.

**Treatment:**—It is of the utmost importance to subdue the inflammation before it has disorganized the pulmonary parenchyma. For this purpose an effective method is the application of ice-cloths to the abdomen, changing every minute for half an hour, and repeating every two hours while the fever is above 103 degrees. Internally the most satisfactory antithermic is a combination of guaiacol and piperazin, gr. 3 to 5 each every four hours. Gr.  $7\frac{1}{2}$  of guaiacol rubbed into the skin over the lung has also shown an efficacy that is remarkable, as this agent is not antipyretic when given internally alone, except as an intestinal antiseptic. For slighter fever the oft-recommended combination of aconitine, digitalin and strychnine arsenate is most useful. The bowels must be kept free by the use of mild, non-depressant saline laxatives, and aseptic by calcium



sulphocarbolate gr. 30 to 60 daily. Decided comfort sometimes follows the application of a cotton jacket to the chest. Night-sweats are restrained by atropine or agaricin until the antipyretic measures have had time to act.

The food should be highly nourishing, easily digestible, and free use made of the artificial digestants, papayotin, diastase and acid-pepsin. Milk, eggs, oysters, beef, game, terrapin or turtle, fruit juices, and the concentrated albuminoids popularized in recent years, are the best foods; though it must not be forgotten that persons differ as to their digestive capacity and tastes, and that each will do best on what he likes best. Beyond this the treatment is symptomatic.

Calcium sulphide has been recommended as a direct antagonist to bacteria, and for its undoubted power of checking suppuration. It should be given in full doses, gr. 10 to 20 daily of the pure salt, continued until the odor of the breath and skin show the body to be saturated with the drug, and then in smaller doses to keep up this effect.

The production of leucocytosis by the administration of nuclein has been also advised. Those who have reported the best results from it gave it in very large doses, up to half an ounce of the standard solution, daily, by the skin or mouth. The idea is too important to be allowed to go by default, and should be tested thoroughly. Too many remedies have been introduced and allowed to fall into oblivion without a true trial.

Whether sprays or vapors ever reach the seat of the disease or not, they are useful in relieving the cough and cleansing the pulmonary tract of secretions. Let the patient steam the lungs by inhaling the fumes of boiling vinegar for ten minutes, and then spray with menthol camphor in albolene, or eucophen in fluid petrolatum. This soothes the irritated tissues, and usually permits a good night's sleep, undisturbed by coughing.

The sickroom must be constantly disinfected by the vaporization of volatile oils, eucalyptol or cinnamon, and by thorough ventilation. Injury to the patient resulting from reinhalation of the floating bacilli is more dangerous than any possible exposure to the outside air. Some consumptives bear the fumes of burning sulphur in an astonishing manner, and then this method of purifying the air is to be preferred. But while there is fever the patient should be in bed, and climatotherapy applies rather to the chronic forms of the malady.

### OTHER FORMS

Tuberculosis of the lip is rare, appearing as an ulcer. The tongue, palate and especially the tonsils frequently form the open door for the infection. In the pharynx, esophagus and stomach the disease is **rare**.



In the bowels it is common in children, from milk infection. This occurs also in adults. The peritoneum and mesenteric glands are involved. When it follows pulmonary phthisis the lesions are usually in the lower ileum, the cecum and ascending colon; sometimes in the rectum, primarily or secondarily. Deposits occur in the glands, caseate, and break down into ulcers irregular in shape, the edges infiltrated or caseous involving the submucous and muscular layers, with colonies in the serosa, and in acute cases showing little tendency to repair. In chronic forms the cicatrices may distort or obstruct the bowel.

There may be few symptoms in children, or merely an obstinate diarrhea, colic and blood, pus and sago-grains in the stools. Constipation may be due to peritonitis or cicatrization. There is fever and progressive emaciation, the diarrhea resists treatment and may be aggravated by opiate. Tender spots are often demonstrable. The lungs may be also affected. Tubercle bacilli may be detected in the intestinal mucus. Colicky pains are characteristic.

Serous tuberculosis is secondary as a rule, acute or chronic. This and other local tubercloses are treated in connection with the organs affected.

The treatment of fever in the tuberculous deserves special consideration. The writers have expended much thought and experiment and perused many works, in the endeavor to find an effective treatment for the fever of tuberculosis. In the older days we attempted to smother the fever by the use of quinine and the coal-tar antipyretics. Nemeyer's modification of Heim's pill was a distinct step in advance, and its value was approved in many instances. Nevertheless no such success ever followed the writer's use of any remedies, including the foregoing, as he secured by applying the simple method of intestinal antiseptics above described to these cases. By clinical experience, during a number of years and embracing many cases, he has been convinced that autotoxemia, from the absorption of toxic matter from the alimentary canal, is the cause of one to two degrees of fever in the tuberculous, and that this may be removed by the methods above described. Whether this portion of the fever is due to the absorption of the ordinary fecal contents of the bowels, or whether the swallowing of tubercular sputa has something to do with it, he is not prepared to say; but this much is certain, that the fever is not due to tubercular ulceration; or if it be, the use of calcium sulphocarbolate in doses of 40 grains a day, after complete evacuation of the bowels, has a curative effect which is not displayed by any other known method of medication. Not only is the fever subdued by this method, but appetite returns, and the entire condition of the consumptive is so markedly changed for the better, that one questions whether so much improvement can be possibly secured from any direct medication of the

affected lungs. The writer, if confined to a single remedial measure in the treatment of pulmonary consumption, would cheerfully lay aside every other to retain the intestinal antiseptic method.

## GLANDERS

Sometimes men who frequent stables contract from the horse this malady, known as glanders when it affects the nostrils, farcy when it appears under the skin. It is an infective granuloma due to bacillus mallei. This is a short non-motile rod much like the tubercle bacillus. Infection occurs in the nostrils or through an abrasion of the skin. The lesion is a mass of lymphoid and epithelioid cells, containing the bacilli. These break down into ulcers or abscesses.

The acute form has a brief incubation, about three days. There is some fever, with disturbance at the site of infection, and lymphatic involvement, the nodules forming and soon breaking down, causing mucopurulent discharge. Papules appear, soon forming pustules resembling smallpox. The nose swells, necrosis follows, pneumonia may occur, the lymphatic glands swell, and the patient dies in about a week.

In chronic glanders—rare—ulcers form in the nose and throat, discharging like coryza; it runs on for months and may get well. The diagnosis requires the use of mallein, or the methods of the bacteriologist.

In acute farcy there is intense local reaction and an inflammation resembling vaccination. The lymphatics are inflamed and form knots called farcy buds along their course. Arthritis, abscesses in the muscles and connective, sepsis, etc., are the symptoms. The bacilli may be found in the urine. Death occurs within two weeks.

Chronic farcy shows tumors on the extremities, with little reaction but ulcers or abscesses forming. There is less lymphatic involvement. It may last years, or death result from sepsis, or the acute form.

Glanders may be transmitted from man to man. Laundresses are liable to it from washing infected clothes.

The treatment is the earliest possible application of caustics, to destroy the infectious focus at once. Farcy buds should be opened and caustics applied. Antiseptic dressings may then be employed, but if cauterization has been thorough they are unnecessary, if not they are useless. The strength should be kept up by scientific feeding and the best tonics and reconstructives.

Mallein, a product of the glanders bacilli similar to tuberculin, has been employed by veterinarians as a means of diagnosis, and of late is being further used as a remedy for this affection with promising success. We have not heard of its employment for man.



## ACTINOMYCOSIS

The ray-fungus, streptothrix actinomyces, causes in cattle a disease known as lumpy-jaw, and sometimes men are infected. It occurs in the discharges as yellow, sulphur-colored grains, up to two millimeters in diameter, composed of cocci and threads interwoven. The organism has been cultivated and reproduced the disease.

Infection seems to take place through food, the mouth being most frequently the location of the attack. It produces granulations like those of tubercle, containing epithelioid and giant cells, with small round cells. As it grows hyperplasia of connective tissue takes place, with suppuration, which may also be caused directly by the organism.

Israel reported the germs found in carious teeth. The jaw is frequently affected, and the tumor has usually been mistaken for sarcoma. Granulations may occur on the tongue, the intestinal mucosa about the cecum and appendix, or in the colon. The organisms have been detected in the feces. The liver may be affected primarily.

Seated in the lungs it gives rise to chronic, infectious bronchopneumonias with cough, fever, wasting and purulent fetid sputa. It is usually one-sided. It may present the aspect of bronchitis, miliary tubercle or bronchopneumonia with abscess. Secondary actinomycotic abscesses may follow in any part to which the germs may be carried. The fever depends on suppuration and is of septic or hectic type.

There may be a typhoid condition. Death is the usual termination, in less than a year. Diagnosis may be made by the fetid sputa, containing the organisms.

This fungus has been detected in certain cutaneous ulcers. Their course is very chronic. One case of cerebral actinomycosis has been reported and two of pleural infection.

The diagnosis is made by the microscope.

The treatment is surgical—complete removal of the infected tissues. Thomassen has reported a number of cures from potassium iodide in doses of a dram daily. If this is true, why may not any of these infections be cured by saturating the body with substances that render it uninhabitable by the specific organisms?

Far more powerful than potassium iodide is the combination of arsenic iodide gr. 1-67, mercury biniodide gr. 3-67, iodoform gr. 1-12, and phyto-laccin gr. 1-2, given four times a day and gradually pushed up to a point just below the toxic, and held there for weeks or months. The writer would suggest a trial of this combination in all this group of infectious maladies for which as yet no remedy has been found, and which are so frightfully fatal. There is all to gain and nothing to lose.



## ANTHRAX

Anthrax is caused by a bacillus, non-motile, rod-shaped, sometimes jointed, from 2 to 25 micromillimeters in length. They multiply by fission and form dense networks. One variety produces spores, the other does not. The bacilli are easily destroyed but the spores sustain boiling temperature, or prolonged immersion in 5 per cent phenol solution. They resist gastric juice.

Anthrax is prevalent among cattle and sheep in Asia and Europe, but rarely in America. Cases occurring in this country among men are mainly or exclusively in tanners. The writer had two cases in Philadelphia workers on goat-skins. The protective vaccine introduced by Pasteur it is hoped will extinguish the malady. In animals the infection is conveyed by insects, or by feeding in fields where animals have died of the disease or have been buried. All animals seem to be liable to anthrax, the herbivora most. Man is infected through the skin, lungs or stomach. Men who are about animals are most likely to become infected, in countries where anthrax prevails; in the United States morocco dressers are most exposed.

**Symptoms:**—Malignant pustule is most frequent on exposed parts of the body. The local symptoms are much like those attending vaccination.

After slight irritation and itching a papule appears, which becomes a pearly vesicle, umbilicated, with a narrow red margin rather than an areola, the base of the vesicle if exposed being black. A zone of brawny induration forms around this, with edema, the lymphatics form red lines leading to their glands, which become swollen. Fever follows rapidly, but soon falls below normal. The induration is so great that if on an arm the circulation is stopped, and the pain resembles that of a tight boot. Gangrene may ensue from interference with the blood-supply. If recovery follows the symptoms subside, the center sloughs out, and the glands return to a normal state. But death is apt to come inside of a week, the patient dying of prostration and sepsis.

In malignant anthrax edema affects the eyelids, head or extremities. There is no papule or vesicle but extensive edema, with gangrene, spreading over much surface, and invariably death. Enteritis, peritonitis or endocarditis may attend. The mind is clear throughout, but the patient may be crazed by fear if he comprehends his condition. The mortality from external anthrax is about 26 per cent in cases affecting the head or arms, 5 per cent if the feet are attacked.

The diagnosis is made by the occupation of the patient, his exposure, the vesicle with black base, and is confirmed by bacteriologic tests.

When infection is received through the stomach we have symptoms of intense poisoning, chill, vomiting, diarrhea, some fever, pain in the calves

and lumbar region. In the acuter forms there are dyspnea, cyanosis, restlessness, anxiety and muscular spasms. Convulsions may occur. Mucous hemorrhages are seen, and petechiæ. The spleen is congested. The blood is dark and fluid after death. If a number of persons eat infected flesh or drink the milk of infected cows, there will result a limited epidemic.

Wool-sorters' disease occurs in the large establishments where imported wool and hair are picked over. Infection occurs from dust swallowed or inhaled. The attack begins with a chill, faintness, prostration, pain in the back and legs, and fever rising to  $103^{\circ}$ . There is pain in the chest with rapid breathing, cough, evidences of pulmonary congestion, weak and fast pulse, vomiting and signs of collapse. The system may be overwhelmed by the attack and death result in a few hours. If the case is prolonged there may be delirium and intense cerebral symptoms or coma, intestinal irritation or pneumonia.

Rag-pickers' disease is a pulmonary anthrax with similar general symptoms. Severe general symptoms may attend external anthrax.

The diagnosis of these internal forms must be made by the bacteriologist. The occupation and sudden access point to this malady.

**Treatment:**—In external anthrax the actual cautery should be applied as quickly as possible, followed by powerful local disinfectants. The obstruction to the circulation may demand long and deep incisions. Internally the need is for the most powerful means of arousing the vital forces and sustaining them. The disease runs a brief course and if life can be retained for a week, there is a chance for recovery.

Ipecacuanha has been advised in doses of gr. 5 to 10 every four hours, but for what reason is not stated. Pilocarpine in full doses might be tried—gr. 1-6 hypodermically. When anthrax germs have been swallowed the intensity of the attack may be lessened by prompt emesis and catharsis. Beyond this little hope exists in any internal form.

The writer was attacked with anthrax in Africa in 1875, and recovered under the use of tincture of iron and aromatic sulphuric acid, a teaspoonful of each every four hours, in alternation.

## HYDROPHOBIA

Hydrophobia or rabies is a disease principally affecting dogs, but also wolves, foxes, skunks and any other animals, including man, to which it may be communicated by the bites of those affected by it.

The period of incubation is unknown and exceedingly variable. As no specific organism has as yet been isolated, it is exceedingly difficult



to accurately diagnose this disease, in man or in animals, from other maladies for which it is frequently mistaken. Youatt, the celebrated veterinarian, did not believe in its existence, and allowed himself to be bitten by supposedly rabid animals many times, with impunity; but finally was seized with dread that he might be mistaken, and committed suicide. Zuill doubted the existence of the disease, saying he had never met a case; and as to the symptom usually adduced of its presence in the dog, the presence of dirt, sticks, and similar trash in the stomach, said he never examined a dog dying of any disease or killed experimentally, without finding such material in the stomach. These things should at least make us cautious of accepting the diagnosis of rabies without sufficient proof.

Horsley says the incubation is shorter in children than in adults; and when the wound is on an uncovered part of the body, especially the face; varying with the extent, depth and severity of the wounds and the animal inflicting the bite, the wolf being worst, then the cat, the dog next and other animals last. In man the period varies between two weeks and three months, and unestablished claims are made for incubation extending over a year or two.

**Symptoms:**—During the premonitory stage there may be some irritability of the wound, or numbness; mental depression, apprehension, hyperesthesia, congestion of the larynx, hoarseness, some fever and accelerated pulse. Much of the mental disquiet is undoubtedly suggestive—the man who has been bitten by a mad dog has reason to feel apprehensive.

Hyperesthesia increases till it is extreme; restlessness grows, reflex spasms are aroused by the slightest causes, the muscles of the face and throat are the seat of distressing spasms, dyspnea is severe, and an effort to drink excites spasm of the larynx, which arouses dread of water—hydrophobia. Delirium may occur of maniacal type, the mind being clear in the intervals. The temperature rises usually but may be subnormal. This stage endures from 36 to 72 hours.

The paralytic stage supervenes, coma comes on, the spasms cease, and the patient dies by syncope within a day. This stage is alone manifested in rodents, where it is termed dumb rabies.

**Anatomy:**—Leucocytes accumulate around the vessels and nerve cells, especially the central motor ganglion cells—the rabic tubercles of Babes. Lymphoid and endothelioid cells gather around the sympathetic and cerebrospinal ganglionic nerve-cells. The latter degenerate. The virus abounds in the cord, brain and nerves, but is absent from the liver, spleen and kidneys.

**Treatment:**—All bites of animals should be quickly cauterized with the agent most quickly available. Bleeding should be encouraged. Such



agents as silver nitrate which simply burn a thin pellicle on the surface are unsafe; better use concentrated lye, which penetrates deeply.

No treatment has yet availed to produce a single well authenticated cure. It has been asserted that pilocarpine has cured, and this may be tried. Many cases popularly believed to be rabies are really septicemia, mania, or altogether autosuggestive, induced by intense fear of the disease, which is fully capable of inducing symptoms thought by the patient to pertain to true rabies. Hence the stories of patients barking like dogs, etc. Sometimes it is impossible to separate these from true cases of rabies, especially when the animal that bit was killed in obedience to a popular delusion, that "if the dog ever goes mad all persons ever bitten by him will also become rabid." Such cases are so much more frequent than true rabies that only its occurrence in infants enables us to believe there is truly a human infection with this malady.

Pasteur found the malignity of the virus increased when it was passed by successive inoculations through a series of rabbits; then that by preserving the spinal cords of the rabbits in dry air the virulence lessened, so that in about two weeks inoculations with it did not kill. By successive inoculations with fresher cords this immunity was established even against the most virulent preparations. This method he applied to the treatment of persons who had been bitten by rabid animals. Figures show that of 13,817 persons thus treated at Paris the mortality was 0.5 per cent, or 69 in nine years, or over 7 annually. This is about the average yearly mortality before the Pasteur treatment was instituted, whereas if all those inoculated were saved from rabies the deaths should have been over 1,500 per annum.

There are still some unresolved nebulae in the Pasteur theories; as, for instance, how it comes that as many persons die of rabies as ever, notwithstanding the inoculation of thousands. And why is it there were not thousands of deaths from rabies before these inoculations were made, if all who were bitten and escaped were saved by this method?

Nevertheless the weight of evidence favors the Pasteur method, so much so that it is our duty to compel patients bitten by animals known to be rabid to have recourse to the method as quickly as possible—the efficacy of the treatment diminishing with each day after infection.

When rabies has developed, if pilocarpine fails, there is nothing to do but keep the victim easy with chloroform by inhalation until death comes to his relief.

In Ziemssen's *Cyclopedia* the reader will find an excellent article on this disease, giving all the delusions, like Marochetti's vesicles, which continually reappear in the lay press, though long since exploded.

Burggraave advised to prevent accessions by the use of strychnine and quinine arsenate; for nervous spasm giving atropine, hyoscyamine, cicutine and camphor monobromide; for fever aconitine, veratrine and digitalin; giving the granules successively, one or two every half-hour according to the strength of the symptoms. It must be remembered that remedies are to be given till the desired effect is secured, no matter how high the doses soar above the maximum of the books. It will be observed that those who become familiar with this method of dosage soon become more optimistic in regard to prognosis than while practising in the ancient manner. The bounds of the possible and the probable are removed by methods made available by the use of certainties in therapy—and how far, is as yet not determined.

## TETANUS

Tetanus is due to infection—generally of a wound—by the tetanus bacillus. This inhabits earth and manure. The disease occurs also in new-born children from infection at the navel—tetanus neonatorum. This was very prevalent in Brazil, where it was the custom to cut the umbilical cord close to the placenta, and coil it up on the abdomen with ointments, where it was left to decompose. Two-thirds of the new-born infants died of tetanus. In one of the Hebrides this malady killed a majority of infants within two weeks of their birth, until people were taught to dress the cord with iodoform, which put an end to the complaint.

Sometimes tetanus prevails in military hospitals, though less often than when the cause was unknown. Some years since there was a large crop of cases following a Fourth of July celebration, due to wounds from toy pistols, and fragments of copper caps, these lesions being especially apt to be infected. A number of cases have followed vaccination, the virus being pure, but germs entering the open sore with dirt from the streets, when not properly cared for.

The disease sometimes occurs in a wound, from sleeping on damp ground. It is not uncommon among horses, and men employed about stables are especially liable to contract it.

The tetanus is a slender rod that may extend into a thread. A spore may occupy the swollen end. It is anaerobic, motile, and grows at ordinary temperatures. It remains in the immediate neighborhood of the wound and there secretes its toxin (tetanotoxin) but does not enter the circulation. It has been transmitted to animals which developed the disease. The poison is a toxalbumin, the most potent known, over 100

times stronger than strychnine. It causes all the symptoms of tetanus when introduced without the bacillus. The symptoms develop so slowly that it is suggested that the bacillus undergoes some modification in the body before becoming active. It lives in the soil and in the bowels of herbivora, and has been produced by inoculating with infected earth. Immunity has been produced by injection of cultures, whose virulence has been diminished by the addition of iodine trichloride.

**Anatomy:**—Congestions, perivascular exudations and granular changes in the nerve cells, no lesions of the centers. About the wound the nerves may be inflamed, red and swollen. In infants the navel is inflamed.

**Symptoms:**—These should develop within two weeks of the injury. The first evidences are stiffness of the neck and jaws, difficulty in mastication, sometimes preceded by rigors. The stiffness increases until typical lockjaw results—tonic spasm, with sardonic grin, the spasm extending to the back, causing opisthotonos. In children it may be confined to the head and facial paralysis may attend. If the entire body is rigid the state is known as orthotonos; if drawn to a side it is right or left pleurosthotonos; while if bowed to the front it is termed emprosthotonos. The spasms may be so powerful that the muscles are ruptured. Affecting the respiratory apparatus asphyxia may result. Spasms of intenser contraction occur, with partial relaxation intervening. Continually slighter irritations induce the spasms—a breath of wind, the touch of the sheet, the opening of a door. They occasion frightful suffering in the contracted muscles. Speech may be impossible, and cold sweat covers the face and body. The temperature may be low until shortly before death, when it rises to hyperpyretic heights, even to  $110^{\circ}$  F. Death may occur from asphyxia, heart-failure, or exhaustion. There is a chronic form, the symptoms at first less marked, the course less rapid. Complete intermissions occur, which become more prolonged. Relapses are common.

In Rose's head-tetanus, the cause is an injury of the side of the head, the symptoms being confined to that side of the head and face, with dysphagia.

**Prognosis:**—This is bad in proportion to the acuteness of the symptoms; 90 per cent of acute cases and 25 per cent of chronic die. It is worse in children. Good omens are a late attack, absence of fever and spasms limited to a part.

**Diagnosis:**—The most similar affection is poisoning from strychnine, but in this the lockjaw comes late, while in tetanus it is an early symptom. Tetany is too feeble an affection to be mistaken for tetanus; the former occurs in hysterics, and is confined to the hands, occurring at intervals of weeks and relaxing promptly when a few drops of any anes-



thetic are inhaled. In rabies the reflex respiratory spasms predominate, psychic disturbance is marked, lockjaw absent.

**Treatment:**—The localization of the bacilli about the wound indicates the necessity of extirpating them there, by excision or cauterization. This should be thorough. Absolute quiet in a cool, dark room is of importance. Food may be administered by the rectum or vagina, the most concentrated and nutritious foods being employed by enema, or on tampons; or fed through a soft catheter inserted into the pharynx through the nose.

Chloroform by inhalation and morphine by hypodermic should be given to full effect of affording relief. Ordinary doses make no impression at all on the terrible pangs. All the benefit accruing to anodynes will be secured from these better than from weaker and more doubtful agents. Anders thinks he saved one patient by hypodermics of strychnine and digitalis.

Is there any curative drug? Many have been tried, and succeeding in some milder cases have been unduly vaunted, only to fail when tried in severe forms. Quinine in doses of 100 grains was extolled by a Virginian physician, but failed in one case where it was suggested by the writer. Of all agents within his knowledge he would expect most from pilocarpine by hypodermic in full doses, enough to cause free sweating and relaxation.

The results from antitetanic serum are not very encouraging. The effects are too slow in developing, unless the serum is injected into the meninges—a procedure not without its dangers. Veterinarians have employed it successfully to arrest the spread of tetanus in infected stables, as a prophylactic. One case was reported in the *Alkaloidal Clinic* in which it was successfully employed thus for a child who had been wounded but had not yet showed any evidences of tetanus. In view of the slight proportion of wounds that develop this malady, the practice does not seem justifiable—the injections being made in the meninges after trephining. Behring urged that his serum should be given not more than 26 hours after the beginning of the attack. Large and repeated doses are required. Out of 96 cases collected by Stintzing 35 died.

Bacelli suggested hypodermic injections of carbolic acid, one to two drams of a  $\frac{1}{2}$  per cent watery solution along the spine. The testimony as to this method is contradictory but on the whole quite favorable. When the dose mentioned failed much larger ones were employed and some successes followed; but afterwards reports of failure with exceedingly large quantities of the acid were published.

The patient may have already passed beyond the possibility of cure, however, and in such matters a single patient rescued from certain death

should outweigh many failures. In the only instance in which the acid was employed in the writer's experience recovery ensued. Nietert reported a recovery after 99 grains had been injected during the first 24 hours and 267 grains during the treatment.

Curarine has been advised as it directly antagonizes the peripheral sensory hyperesthesia. But as this is simply a manifestation of the toxemia, and curarine does not eliminate the toxin, there seems little use in smothering the symptom when the damage is still continuing. The patient does not die from the hyperesthesia but from exhaustion. This objection applies as well to all remedies for non-essential symptoms.

Sufficient attention has not been given to excision of the tissues about the wound, in which the toxin-secreting bacteria are collected.

In International Clinics Stevens quotes 26 cases, exclusive of Vallas' 6, treated by antitetanic serum, of which 10 were failures. Bearing in mind the tendency to report only favorable cases, this is significant. Letulle urges the Calmette method of treating wounds likely to occasion tetanus: Wash with boiled water 15 minutes, dust thoroughly with dried powdered antitetanic serum, and cover with gauze.

## MEDITERRANEAN FEVER

This malady is known as Malta fever. It prevails especially on that island and along the Mediterranean, also in the West Indies where we meet it in Porto Rico, and in the Philippines in the East. Possibly its range is wider but it has been confounded with typhoid and malaria.

The onset resembles that of typhoid—lassitude, anorexia, bone-ache, headache and malaise. These increase till the patient ceases to work and remains in bed. The headache has become intense, with constipation and thirst. The tongue is coated, stomach sore, throat red. Cough and roughness at the base of the lungs indicate congestion. There may be nocturnal delirium. The fever resembles typhoid, rising during the day and sinking at night, with free sweating toward morning. The spleen and liver are enlarged. Pain in the back may be distressing.

This attack may last a week or more, when improvement sets in and appetite returns. Fever, weakness and sweating remain, with anemia but better sleep. Then the patient begins to feel rheumatoid pains shifting from joint to joint till the whole system may have been affected. Neuralgias and orchitis may complicate.

The fever may gradually climb for ten days to  $104^{\circ}$ , then subside slowly, with a range like the first week of typhoid. In most cases apyrexia is followed by another rise, and this may go on for months. The fever may remit, intermit or be nearly continuous.



The mortality is about 2 per cent, but it leaves anemia, rheumatoid pains and neuralgias that are distressing. Death may result from sudden hyperpyrexia, from pneumonia, or exhaustion. There is no pathologic anatomy except the large, soft spleen with numerous lymphoid cells. In it is found a peculiar organism, the micrococcus *Melitensis* discovered by Bruce, which is but rarely detected in the blood. Injections of pure cultures have imparted the disease to monkeys. The parasite is flagellated (Gordon.)

This fever is most common in persons between the ages of 6 and 13. Acclimatization does not confer immunity. It is most common in the drier seasons. It haunts certain houses. Bad water and fecal infection are blamed. It is not contagious. Incubation lasts from 6 days to 17. Bruce held it to be self-protective but others claim an attack increases liability to others.

The diagnosis from typhoid is at first difficult, being based largely on the absence of distinctive typhoid symptoms, and the occurrence of arthritic pains and sweating, the history of the presence of either, and the Widal test. The germ of Malta fever reacts more markedly than that of typhoid. Even the prognosis is indicated by the test, being bad if agglutination remains low or falls from a high point to zero. If a high reaction falls much a long course is to be expected.

**Treatment:**—Prevention teaches the avoidance of affected places in the warm months; and care as to the purity of drinking water. The rules of municipal and personal hygiene are simple and too well known to warrant repetition. Begin with calomel, follow with salines, and employ cold sponging to keep the temperature below 103. Manson condemns quinine and salicylates, and doubts the advisability of coal-tars in such a disease of prolonged debility. The treatment is symptomatic. It is to be hoped that the principles of intestinal antisepsis may be applied in this malady by those who comprehend them and have the opportunity.

The food should be light—milk, broth, eggs, liquids as long as fever remains and until the tongue has been clean for 10 days. Lemonade is useful after the first period. Flannels should be changed when wet with sweat. Change of residence is not specially advisable.

## WEIL'S DISEASE

An acute infection fever with jaundice, described first in 1886. Most cases occur in summer, in groups, especially in butchers. Lanphear has described cases occurring in this country. It is more frequent in males between 25 and 40.

The attack is abrupt, with chill, headache, backache, and leg-ache as usual in acute infections; but there is often a severe pain in the cheeks



which is peculiar to this affection. The fever is remittent. The spleen and liver are enlarged. Jaundice occurs early, usually with acholic stools. The stomach and bowels are not affected much. The urine is albuminous, sometimes containing blood. Delirium and coma are occasional symptoms.

The course runs from ten days to two weeks. There is no distinctive anatomy known. Jaeger claimed the malady was due to a proteus infection.

The treatment as yet is to be conducted on general principles—calomel and saline to empty the bowels, sulphocarbolates enough to disinfect them, aconitine to allay fever, cardiac tonics to sustain vitality, possibly dioviburnin or boldine as specific for the hepatic condition; rest, quiet, mild easily digestible and nutritious food, avoiding fats, and giving bile or cholic acid to compensate for the failure of the liver and prevent the consequences sure to arise from the absence of bile from the bowels. If the liver is very tender a blister or hot water bottle over it should be of use. Depleting the portal system by enemas of glycerin or of concentrated salt solution may prove of value.

## BERI-BERI

The acquisition of the Philippines and our growing interests in the East render this affection of possible interest to us. It is a multiple neuritis, occurring frequently in Japan. It has been found among Massachusetts fishermen, and in the asylum at Tuscaloosa, Ala., also at the State Asylum at Little Rock, Ark., in 1895. Possibly were its features better known more cases would be recognized.

Some believe beri-beri to be caused by a specific microorganism, as yet unidentified. It spreads from foci, attacks young and robust persons, prevails at certain seasons, and has spread as an epidemic. While not believed contagious it seems to be transported from place to place. In Japan it is attributed to a diet too exclusively of rice, or to bad rice; and great improvement has followed the addition of nitrogenous articles to the diet. Kisagi forbids fresh fish, to which some have attributed the malady. From one-fourth of the strength of the Japanese navy being subject to beri-beri, the disease has by these changes in diet been extinguished. In Java it has ceased when unshelled rice was substituted for the shelled. Bad hygienic conditions and residence in damp places predispose to beri-beri. Males are more liable, especially men between 16 and 25.

**Symptoms:**—In one class of cases the most prominent symptom is paralysis of the lower extremities, motor and sensory, affecting also the fingers and isolated areas on the arms and trunk with anesthesia. The calves are thin, muscles tender, giving the reaction of degeneration, reflexes

at knee and ankle absent, deep reflexes lost but superficial present except in advanced cases, ataxia and weakness, no tremor, rarely any implication of muscles of the head or neck. The sphincters and detrusors are normal but dyspepsia and distention after eating are common. The gait is ataxic with real muscular weakness added. The toes may drag so that the patient walks with a "string-halt." The urine is normal, digestion fair, eliminants active; in fact the general condition is remarkably good except for peripheral neuritis.

The heart's impulse is diffused or obscured by effusion in the pericardium. There is pulsation in the epigastrium and of the carotids. Jugular pulsation shows tricuspid regurgitation. The dull area is widened to the right. A systolic murmur is present, with a double second sound. The interval is shortened. Slight exertion causes rapid heart-action. Vascular tension is relaxed. The cardiac signs vary from time to time, showing the difficulty to reside in the innervation.

In another form the cardinal symptom is dropsy. Anasarca is universal, the face cyanotic, the urine scanty and dark. Little or no albumin is to be found. Pressure causes less pitting than in nephritis. The edema may be local and transient, and infrequently involves the scrotum. The heart-symptoms resemble those described above. Effusion may take place into the pleura. Dyspnea prevents exercise. Reflexes are weak and absent; the shins and finger tips anesthetic. Digestion is good but there may be pain and tenderness in the stomach. Manson attributes the dropsy to alteration of the nerves governing urinary excretion and osmosis in connective tissues.

In a third group the two forms are variously commingled. Fever is not a feature of either form.

Cases present all grades of severity, and distribution of symptoms. Much difficulty is experienced in diagnosis by those not familiar with the protean aspects of beri-beri. Filariae are sometimes found in the blood as an accidental complication. Other parasites are detected in the stools.

The cases generally will be found to come from some center of the disease which supplies several typical forms and mixed cases, and from these the atypic may be detected and classified.

The attack may be sudden or insidious; the course rapid or slow. Malignancy may supervene at any time upon milder forms. It may subside in a short time, and relapses occur. Complete recovery is usual but muscular atrophy or organic heart-disease may remain. Unexpected recovery from most threatening forms and sudden death in mild cases are not unusual. The heart may fail at any time.

The paraplegic cases are known as dry, the dropsical as wet beri-beri.



**Etiology:**—Both sexes are liable, all ages except the extremes, all occupations are affected but a sedentary life predisposes, and asylums and jails are frequently invaded. Pregnant and puerperal women are especially liable. The plethoric are not immune. Hot weather favors the disease, and the rainy season. It clings to localities like malaria, especially if wet and hot, and affects persons sleeping near the ground. All depressing conditions favor its outbreak. It does not shun the city like malaria, and often appears among the crews of ships. Overcrowding with poor ventilation has a distinct influence in developing the disease if the germs are present. It does not seem to be contagious, or directly infective, but it may become implanted in a hospital offering the requisite heat, dampness and overcrowding, and then nurses may be affected. Since patients improve at once when removed from their bad surroundings, Manson attributes the malady to a toxin generated by a germ inhabiting the place rather than the patient's body. It is therefore a sapremia, or the germs in the body soon die and the disease ceases unless fresh germs are continually introduced. The improvement following the addition of nitrogen or fat to the diet may be explained as lessening the suitability of the body as a field for the cultivation of the as yet undiscovered germ.

The condition found at post mortems is degeneration of the distal ends of the peripheral nerves. There may also be atrophy of muscular fibers of the heart and elsewhere, dilatation of the right cardiac cavities, with great accumulation of blood in them and the veins; serum in the connective and great serous cavities and often pulmonary edema.

Death most frequently occurs from complication of the cardiac nerves, sometimes of the pulmonary. Dilatation is the most dangerous condition arising. Anything pointing to heart-weakness or disease is of bad omen. Very scanty urine is bad, also large serous effusions, and paretic implication of the muscles of respiration. Vomiting is considered a fatal prognostic in Japan. Dropsy is more dangerous than other forms; more die in low places than in elevated, and the acuter cases are more to be feared. The mortality varies in different epidemics from 30 to 5 per cent.

**Diagnosis:**—Ordinarily the diagnosis is easy—multiple peripheric neuritis is beri-beri when epidemic or endemic. Edema over the shins especially distinguishes it from alcoholic neuritis, as does the heart-affection. Rheumatism is not a tropical disease, the altered reflexes and tender calves are not rheumatic. In the natives of tropical lands all pareses, edemas, cardiac affections and rheumatic pains are possibly beri-beri.

**Treatment:**—Remove the patient from the infected place at once. Select a dry locality and put him at the top of the house, in a well-ventilated sunny room. Feed well, with plenty of nitrogen and little bulk. Substitute



wheat, barley or oatmeal for rice. Milk and eggs are useful, with plenty of fat. If the heart is notably affected confine the patient to bed. Other cases should be in the sun and air. In dropsical cases limit the fluids taken and give salines. Heart-tonics seem useful—digitalin or strophanthin. Glonoin may be needed for acute dyspnea or failing heart. It should be ready for emergencies, as well as amyl nitrite for still more imminent danger. It may be necessary to bleed to relieve the overburdened heart. Serous effusion may require aspiration. Faradization and massage are useful for the muscular affection. Strychnine, arsenic and silver are then of use as tonics. Take care to avoid deformity by contractures. Relapses are to be prevented by shunning sources of reinfection. Sea voyages are very beneficial. Patients recover if removed to healthy places.

If the malady appears in an institution it is to be emptied at once and inmates removed to high and dry quarters. The hygienic conditions must be remedied if the premises are to be again utilized. When the disease appears on a ship, ventilation, drying, removal of bilgewater and rotten wood, are to be enforced, with removal of the sick to the open air and revision of the diet. Disinfectants are advised, but it is well to say little of them, the tendency being strong to rely on scattering about a lot of phenol and neglecting everything else. But fumigation with burning sulphur is useful as destroying all germs in clothing and other articles that might escape ordinary disinfecting.

## MILK DISEASE

In the Mississippi Valley and the eastern slopes of the Alleghanies there has prevailed a disease of cattle known as the trembles. It affects newly settled localities and disappears as the forests are cut and the soil brought under cultivation. The animals may show no sign of the malady unless over-driven, but their products are nevertheless toxic. The sick cow refuses food, staggers, her eyes are injected, her muscles tremble, and she has convulsions.

To man the disease is communicated by the flesh, milk, butter and cheese from affected animals. The poison is not destroyed by cooking. It is fatal also to dogs. Evidently this is not a bacterium or protozoan but a fixed poison acting chemically. Probably it is due to some plant that is eaten by the cow, but which is exterminated or loses its toxicity when clearing and cultivation become general.

In man the symptoms are uneasiness and gastric trouble lasting some days; then vomiting and pain in the stomach begin, with fever and thirst. Constipation is obstinate. The tongue is swollen and tremulous, the

breath bad with an odor said by Graff to be distinctive of this disease. There may be marked cerebral involvement, restlessness, coma, convulsions and delirium. Death may occur in two days, or after the symptoms have run into a typhoid state. It may drag along for a month.

**Treatment:**—Empty the stomach and bowels at once to get rid of any remains of the toxic material, sustain the strength; promote elimination; quiet fever and restlessness.

## FOOT-AND-MOUTH DISEASE

There are still a good many dark corners in medicine, and not a few of these might be cleared up were we to turn into them the light obtained from the study of disease of animals. The present day sees the problems presented by malaria and yellow fever solved by a study of the mosquito. The spread of typhoid fever by the housefly, of tuberculosis by the bedbug, of plague by the fleas appertaining to rats and dogs, are more or less established. The diseases of animals, especially the domesticated beasts, transmissible to man, have been studied from one side or the other; but as yet the facts elicited by the physician of human beings and the modern veterinarian have not perhaps been correlated as closely as they might be.

The malady in question affects cattle, sheep, pigs and other domestic animals. It is an acute affection that spreads with unexampled rapidity. The period of incubation is less than five days. The attack begins with fever, and little vesicles appear on the mucous membrane of the mouth, that enlarge and ulcerate. The animal wastes rapidly. The disease appears also upon the udders, the milk becomes yellowish and mucoid in consistence.

To the human species the infection is conveyed by the milk, and hence children are the usual sufferers. Milk products, such as butter and cheese, also convey the infection. It causes fever, diarrhea and vomiting, an eruption of the intertrigo type, and an aphthous deposit on the mucous membrane of the mouth and pharynx. Hemorrhages are common in some epidemics, of which some are quite fatal, though the mortality averages about 8 per cent. Filters of unglazed porcelain arrest the passage of the smallest microorganisms known, but the virulence of the vesicular lymph remains after passing through these filters (Loeffler.) The flesh of affected animals is not believed to carry this infection, and it seems likely that heat destroys it. If this be so, the milk may be rendered harmless by boiling.

The only treatment suggested by the text-books on medicine is the application of powerful germicides, as strong as the tissues will bear, and frequently repeated. No special agent has been shown to be best suited



to this affection, but saturated salicylic acid solutions, and lactic acid, have proved useful in other aphthous conditions.

The strength of the patient should be carefully maintained by judicious feeding and suitable tonics. So far the books carry us. Limiting themselves to measures that have stood the test of time, anything experimental would naturally be excluded from their pages. But as there is nothing of any value in their limits, we are perforce driven to let the patient get through the best way he can, unaided, or to use some of the methods as yet on trial.

Some of us have learned to credit pilocarpine with a remarkable power of combating certain forms of invading microörganisms, and especially the smallest known forms, such as the micrococci. The control exerted by this alkaloid over erysipelas has scarcely a parallel in established therapeutics. Those who have employed pilocarpine in scarlatina report results little inferior. Its effects in foot-and-mouth disease might wisely be investigated. A dose of this agent sufficient to cause slight sweating or salivation may be given, and the action sustained by cumulative dosage. The control exerted over boils and other forms of suppuration by calcium sulphide has long been known.

The prognosis is largely influenced by the strength of the patient's resistance against the invading disease.

What is the best local antiseptic for application to the aphthous patches? Lactic, benzoic, boric and salicylic acids; chlorine, iodine, bromine; iodoform and its congeners, eucrophen, aristol, and iodol; peroxide of hydrogen; the volatile oils; resorcin; phenol, lysol, tricresol; the corrosive salts of mercury, silver, iron, copper, zinc, cadmium; arsenous acid; and this is not a complete list by any means. One or other of these must be better than the rest—which is it?

Bad hygienic surroundings determine malignancy in all the group of infectious fevers as affecting mankind—is this equally true as regards animals similarly affected, or does continued contact with such morbid agencies beget immunity?

## GLANDULAR FEVER

In 1889 Pfeiffer called attention to this malady as a distinct form of acute infectious fever. It occurs in children, especially between five and eight years of age. It may occur as an epidemic. The specific cause has not been ascertained.

Glandular fever commences with pain and consequent stiffness of the neck; nausea, vomiting, pain in the bowels, fever moderate, some soreness of the throat, with swelling of the tonsils which soon subsides. Inside



of three days swelling occurs of the cervical lymphatic glands, those behind the sterno-cleido-mastoid especially; also the inguinal and axillary glands in many cases. The mesenteric glands, spleen and liver are often enlarged. Sometimes the glands are enormous. They are tender, and may be surrounded by puffiness of the connective. There is no catarrh attending. Suppuration, hemorrhagic nephritis, otitis media and retropharyngeal abscess have been reported as happening in some cases. The fever passes off in a few days but the glandular swelling may persist for weeks.

The writer has met several cases of a similar disease in adults, one case occurring in a woman of 26 years. The posterior cervical glands were swollen and tender, there was slight fever with malaise and anorexia, and the superficial glands all over the body were similarly affected. Small doses of iron iodide were followed by iodism to a degree the writer had never witnessed. The swelling of the subcutaneous glands was nowhere larger than a pea. It persisted several weeks and passed away gradually.

**Treatment:**—No treatment has as yet been demonstrated as useful, but the general rules of treating fevers are applicable here. The well-known power of phytolaccin to dissipate glandular inflammations renders its use here advisable; all the more since the less useful and objectionable properties of that other gland stimulant, calomel, have been advised. What it can do, phytolaccin can in this case do better. Give a child gr.  $\frac{1}{6}$  every hour till nausea or softening pulse denote saturation; then every two to four hours.

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## PART II

# CONSTITUTIONAL DISEASES

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### AUTOINTOXICATION

The theory of autointoxication was firmly held by our ancestors, whose initial treatment of all inflammatory affections consisted in emptying the alimentary canal and freeing the emunctories, besides relieving abnormal vascular pressure. The reaction that commenced with Graves' feeding fevers carried the entire depressant medication away, and it is only in recent times that anyone has had the courage to assert that the acceptance of new theories as to pathology does not carry with it as a necessary consequence the desertion of methods of treatment that have proved successful. The explanation given of the *modus operandi* of these may be erroneous, but it does not follow that the therapeutics is therefore worthless.

The elimination of toxins remained, however, as a cardinal principle in the practice of the masses of active clinicians, despite the rise and spread of the supportive idea; and when anew proclaimed by Bouchard with Gallic vividness it found a ready response. An examination of its merits was in fact forced on the profession, and the result has been that such convincing facts were developed that the truth of the principle has become too apparent to be ignored. This theory and its application in the treatment of fevers are fully discussed elsewhere; we will limit ourselves here to a presentation of the topic in general, discussing first the case as presented in the monograph by Von Noorden.

His work is based on toxins that have actually been isolated and their origin and effects determined. The work is by no means complete but enough has been done to show that there is a solid chemical basis for the doctrine of autointoxication.

**Acid Products of Metabolism:**—In breaking up and rearranging proteids, fats and carbohydrates, certain acid intermediary bodies are formed, that undergo further alterations or are excreted; carbonic acid free by the lungs, sulphuric, uric, phosphoric, hydrochloric acids in combination, by the kidneys. The alkali is supplied by the food, the sodium of the blood and potassium of the cell protoplasm. Reduction of the alkaline reaction of the body entails serious consequences. In the dog when the



food alkali is reduced the nervous system becomes deranged and assimilation disturbed, death finally resulting, with spasms. The cause is sulphuric acid intoxication (Bunge), produced by proteid catabolism.

When the administration of acids is pushed the alkali is lost more rapidly, in herbivora; respiration becomes more rapid at first, then slows; the pulse is faster, vascular pressure rises, both falling off later; the animals become ataxic, have spasms and die in coma. Carnivora are protected by their superior power of generating ammonia which protects the fixed alkalies. Man shares this advantage. Similar evidences are recognizable clinically when the blood alkali is reduced, and acids with ammonia are excreted far in excess of the normal quantities.

Acids may accumulate if their excretion is reduced or their formation increased above their elimination. Clinical importance attaches to the increase of acid formation with defective elimination. The acids concerned are sarcolactic, carbaminic, aliphatic, oxalic, uric, aromatic oxy-, and especially beta-oxybutyric, diacetic, and acetone; the latter three being known as the acetone bodies. Their chemical relations may be shown by the following:

Beta-oxybutyric acid:  $\text{CH}_3\text{—CHOH—CH}_2\text{—COOH}$ .

Diacetic acid:  $\text{CH—CO—CH}_2\text{—COOH}$ .

Acetone:  $\text{CH}_3\text{—CO—CH}_3$ .

The first is oxidized into the second, which forms acetone and carbonic acid on being warmed. The occurrence of acetonuria is therefore to be attributed to a peculiar interference with oxidation, and the appearance of oxybutyric acid indicates a higher degree of such interference. Acetonuria is a form of general acid intoxication, and the acetone acids are no more toxic than any other acids. Some acetone is excreted during health, more during fasting; and if this is prolonged the other acetone bodies are also excreted. If the food is limited to proteids and fats the same thing occurs, and the acetone bodies only cease to appear in the urine when carbohydrates are administered. Their excretion is also increased by feeding with fatty acids, as in butter, provided the carbohydrates are excluded.

The acetone bodies are now looked upon as intermediate products of metabolism, which owing to the absence of carbohydrate food are not consumed, producing carbonic acid and water. The acetones are formed in the cells, somewhere, possibly in the liver, the carbohydrates acting as preventive by affording oxygen in nascent form, or furnishing necessary intermediates, since there is no lack of respiratory oxygen when acetones are produced.

In the experimental acetonuria of phloridzin and pancreatic diabetes, the acidosis of human diabetes, febrile acid intoxication and the cryptogenic form of these intoxications, the acetone formation is attributed to poisons formed in the intestinal canal (Kraus). Von Noorden does not consider this assumption necessary, attributing all acetonurias to the perversion of carbohydrate digestion and assimilation. The excretion of acetone bodies is to a certain extent proportional to the height of the fever, but it subsides rapidly when the quantities of carbohydrates in the food are increased (Hirschfeld). The same conclusion has been reached as to carcinomatous acetonuria. These facts deprive acetonuria of much of the prognostic significance formerly attributed to it.

There are, however, some other factors influencing the appearance of acetonuria when the carbohydrates are withdrawn—the individuality of patients exerts a marked effect, and those who are accustomed to use but little carbohydrates bear their complete withdrawal better than others who have been accustomed to the freer use of these articles.

It follows that in all non-diabetic acetonurias the first principle of treatment is to add a supply of carbohydrates to the diet, five ounces a day sufficing in any case, according to Von Noorden. If, as in severe gastroenteritis, it be necessary to ingest this food by the veins or subcutaneously, dextrose or levulose must be employed since the disaccharides are only disintegrated in the alimentary canal. The free administration of salines neutralizes the acids and at the same time eliminates these toxins from the body.

Bouchard calls seriously in question the prevalent overvaluation of vicarious elimination. The removal of water from the body does not necessarily carry out with it a proportional quantity of toxins. While 1,000 grams of urine remove 15 grams of urea, 1,000 grams of sweat only remove 0.30 gram; and the same proportion holds good for the bowel. The skin eliminates water with a little salt, carbonic acid and volatile fatty acids. Perspiration is useful in some poisonings by eliminating not the poisons but some of their products. But pilocarpine sweat contains five times the normal proportion of solids. The lungs eliminate water, carbonic acid, sometimes ammonia, fatty acids, and volatile poisons accidentally swallowed. The kidneys eliminate everything except gases—water, two-thirds of the solids excreted, many nitrogenous substances.

In nearly all diseases death is caused by asphyxia, and this by intoxication. The urinary poisons of two days and four hours kill the average man. Bouchard found in the urine seven toxic substances, of which urea was least injurious. Potash and an unknown body cause convul-

sions, others give rise to narcotism, salivation and mydriasis, and one lowers the production of heat. These toxins are supplied by the tissues, the secreting organs, foods, and the decomposition of fecal elements. Part of the toxicity may be removed from the urine by fixing that of the intestine, by charcoal. Bouchard objects to soluble antiseptics, as they lose some power before they reach the large bowel, and by entering the blood may exert there a noxious influence. But neither of these is necessarily true, and in dealing with each agent we may ask whether either objection applies to it. Abundant experience with the sulphocarbolates shows that neither applies to them—they surely disinfect the bowel and the stools, and they do not cause any evil by being absorbed into the blood, even when given in doses far above what are usually required to disinfect the bowel.

Whenever the progress of the fecal mass is arrested, decomposition of some sort commences, and some of the resulting toxic matters are absorbed into the blood. The effects of this hemic contamination may be shown in any part of the body, since the blood carrying the toxins to every part, the most impressible or least resistant tissues will react most evidently against the irritant. Hence we may have an infinite variety of phenomena rather than any distinct clinical picture. Perhaps the most common evidences are headache, dullness and sluggishness of mind and body, apathy and morbidity, the "blues," itching and other irritations of the skin, anorexia, bad breath, aggravation of preëxistent catarrhs, and in fact the whole complex usually attributed to "uricacidemia." In fact, it is now understood that since uric acid is non-toxic the phenomena assigned to this form of autotoxemia are in whole or great part due directly to fecal retention and absorption. The perspiration may become offensive, the eyes heavy and conjunctiva muddy, the skin pimply and unhealthy, the urine strong and dark.

The effects of fecal autotoxemia form a field as yet unexplored, and we can only indicate them in a general manner. The kidneys, liver, lungs and skin aid in eliminating the toxins, and disorders of either or all these eliminations may follow in time. The continued effect of an empoisoned blood-supply on the tissues can not fail but prove baleful, and we may have here the explanation of chronic maladies of the delicate tissues of the spinal cord, and of other organs. At any rate, such toxication lowers the vital resistance and renders the body at large and the tissues of the points of lowest vitality more liable to microbic invasions.

When the various toxins recognized by Bouchard have been isolated and studied scientifically we may assign to each the morbid phenomena for which it is responsible, and trace the toxin to its source. Scarcely



a suggestion has yet been given to the possibility of such studies, and the only intimation of differentiation is the remark that mercaptan is the cause of melancholy. There is most probably a specific toxin that causes itching, and the presence of pruritus may direct attention to fecal retention and this toxin formation. But the special effects of indol, skatol, and other already recognized toxins, have not been fixed definitely.

**Treatment:**—Empty the bowels, disinfect them, keep them from filling up again, and regulate the diet and personal hygiene.

An evening dose of podophyllotoxin followed by a morning saline may be alone required; or it may demand a week or more of careful treatment, medical and mechanical, to fulfill the first indication.

Disinfection is not superfluous; no matter how well the cathartics have acted there is a distinct gain from chemical disinfection, such as is obtainable from the sulphocarbates.

It is usual to meet the dietary indication by restricting the intake of nitrogenous foods; but this is simply because we can smell the toxins emitted by their disintegration, and several containing nitrogen have been isolated. The diet must be regulated to supply—and not over-supply—the patient's needs, and his powers of digestion. The injunction, hurriedly dropped as an afterthought, to restrict meat, makes little impression on the patient; lay down the law positively and tell him just how many ounces of meat he may take each day. The more carefully the directions are given, the better they will be obeyed.

The same holds true as to exercise, bathing, work, etc. Study each case by itself, apply the regimen indicated, but be ready to alter it wherever it proves a misfit.

To prevent the bowel filling up, involves the treatment of dilatation of the stomach and paresis of the colon, and these are considered in their proper place.

## DIABETES MELLITUS

Diabetes is a chronic affection in which glucose is excreted in the urine. The urine shows traces of sugar to the most delicate tests at all times. Transitory glycosurias occur in several diseases, and an excess of carbohydrates in the diet may occasion it in a healthy man; but these are not diabetes. Neither are the excretion of lactose by nursing women, nor the occasional appearance of pentoses, glycuronic acid and levulose.

**Pathology:**—Diabetes has been ascribed to pancreatic disease, suparenal excess, interference with the glycogenic function of the liver, microbic

action, deficiency in the conversion of fat by the protoplasm of the intestinal villi, etc.

Normal human blood contains 1-10 per cent of sugar, loosely combined, which may escape if too plentiful or if the kidneys become permeable to it. Combined with lecithin it forms jecorin (Drechsel), and Kolisch attributed diabetes to the loosening of this union. Phloridzin is a diuretic, stimulating the renal epithelium, and producing glycosuria, probably by decomposing proteids. Nephritis diminishes glycosuria in all forms.

The true cause is increase of the sugar in the blood, which may even reach 10 per cent. The hyperglycemia at first corresponds to the glycosuria but increases as the case progresses.

Puncture of the tip of the calamus scriptorius causes glycosuria, continuing till the glycogen of the liver and muscles is exhausted. Nervous irritation may occasion transitory attacks and influence the course of any form. When the food CH exceeds the storage capacity of the liver and is not converted into fat, the surplus appears as glycosuria. At one meal the system can assimilate 150 to 200 grams of glucose, 120 of milk sugar, 150 of levulose, on an average. Cane and milk sugars in the urine indicate a lack of ferment in the bowel, not excess of glycogen in the liver. Maltose is converted into glucose, and those who can not do this have glycosuria after indulgence in beer even if other carbohydrates do not cause it. The assimilation of pentoses is very low.

To test the assimilation of glucose, administer 100 grams in water on rising, and test for sugar; none appears in the urine of healthy persons. It may appear in traumatic neuroses, cerebral and meningeal inflammations, mental disorders such as mania, and in paralysis, fevers and alcoholism. These may be explained by passing irritations of the nerve centers or disorder of the pancreas. Alimentary levulosuria indicates hepatic insufficiency.

Most of the phenomena may be explained as due to failure of the tissues to form glycogen, the dietary CH being exerted by the kidneys. But exercise does not lessen the glycosuria, actually increasing it except in slight cases. Levulose being more easily assimilated than other carbohydrates lessens glycosuria and increases glycogen storage. The presence of levulose in the urine when not ingested or any CH is used is a bad omen.

**Etiology:**—Destruction of the pancreas causes glycosuria, slight if 1-5 of the gland remains, but diverting the pancreatic secretion from the bowel does not cause it. This leads to the theory that diabetes results from the loss of an internal pancreatic secretion, which stimulates glycogen formation



or checks its destruction. Fat formation may proceed, causing obesity; or fail later, superadding diabetes; or be deficient from the first, causing diabetes without obesity. The tissues take sugar from the blood and the deficiency is supplied automatically by the liver, from the food CH, and when this is cut off, from the proteids; casein contributing most, then legumin, egg-albumin and cereals least. Of fats, glycerin and lecithin supply sugar, the fats of the body being utilized, not those of the food.

The formation of acetone bodies is fully considered in the article on autointoxication. When all the CH and most of the proteids eaten appear in the urine as sugar, the excretion of acetone indicates the intensity of the diabetes. When acetone excretion reaches 4 decigrams a day, diacetic acid appears; when it reaches a gram a day, oxybutyric acid will be excreted. The odor of acetone will appear on the breath. In mild cases the system acquires the power of disposing of these bodies, but if severe their excretion rises to a gram a day, and the slower this declines the worse the prognosis. If the decline will not begin until CH is added to the diet the outlook is ominous. The daily excretion of acetone and diacetic acid may rise to 6 grams, but that of oxybutyric acid may even reach 80 grams. But even when the excretion is great and the danger corresponding, life may be prolonged for years. When the acids cannot be neutralized by the ammonia formed from proteid foods, the fixed alkalies of the body are drawn upon, nutrition suffering. As the supply of these fail, the acidemia occasions coma. The administration of alkalies postpones this for a time, but the acetone salts are toxic.

**Etiology:**—Diabetes is hereditary, more frequent in males, usually beginning after 35 and before 60, is more common among the rich, and especially Jews, neurotics, brain workers with sedentary habits, the obese, syphilitics, cachectics in general, and is increasingly prevalent in France and India. It has quickly appeared after nervous shocks and strains, or acute infectious fevers, and during pregnancy. Some cases occurring in man and wife have seemed to indicate contagion, but the similarity of habits and other causes may account for these.

**Symptoms:**—The course is exceedingly variable, the beginning is unknown, the early symptoms uncertain. At first glycosuria appears after excesses, occasionally, and may not become continuous for years. Many times it is accidentally revealed by an examination for life insurance. Transitory glycosuria indicates an abnormal liability to the malady, and the wisdom of regulating the diet. The usual history is of progressive debility, emaciation, cutaneous irritability, neuralgia, weak sight, cramps in the calves at night, thirst and frequent and copious micturition. Slight



exertion causes fatigue, the temper becomes irritable, and impotence may occur early. The usual treatment gives little relief. The sugar is detected in the urine. Men who urinate in the open are apt to present white sugar spots on their trouser ends.

The course is rarely acute. Headaches are common, with indigestion, the appetite becoming greater as the waste increases. The urine may increase till gallons are voided daily. It is pale, the s. g. up to 1050 but usually near 1030, the odor sweetish, acid, the sugar daily lost amounting sometimes to a pound, urea increased, ammonia also, and sometimes the phosphates. Slight albuminuria is common at first, grave nephritis develops late, interstitial, with arteriosclerosis, etc. Gases may form from fermentation in the bladder. The great thirst and appetite may occasion gastric dilatation. The bowels are usually constipated, the tongue dry and rough, gums unhealthy, teeth decay, saliva acid and contains sugar. The liver may enlarge. Cutaneous symptoms are pruritus, general or of the vulva, balanitis, eczema, skin dry and harsh, the hair falls, the nails sometimes also, boils, carbuncles, gangrene especially of the feet and edema.

The approach of coma may be indicated by drowsiness, mental fog, digestive disorder, irritability of the stomach and readiness of mental or bodily fatigue on slight exertion. The drowsiness suddenly deepens, respiration quickens, the pulse becomes fast, and coma may end in death within 36 hours. Coma may also develop suddenly after unusual exertion, or acute infections, alcoholism, or anesthetization.

The demand for food is increased by the want of assimilation, stomach but not tissue hunger being satisfied. The excess of nitrogen taken adds to its excretion but the tissue proteids are better protected than in healthy persons. The blood serum may contain fat in excess of the normal 1 per cent, derived from food and the tissues. Assimilation is defective from the lack of lipase, the fat ferment.

When methylene blue is added to diabetic blood the blue color is reduced to a yellowish red. Diabetic blood smears treated with methylene give a pale green. (Williamson-Bremer reaction.)

Peripheral neuritis is common, causing ataxia, anesthesia, sometimes perforating ulcer of the foot. The deep reflexes may be absent. Cataract is not uncommon, and other ocular and aural affections may be seen. Gastric crises occur, with colic, fever and vomiting. Occurring in pregnant women, the fetus is apt to die or premature delivery occur, the diabetes being worse after labor. The temperature falls below normal as the malady progresses. Emaciation may be masked by fat, or edema.

Diabetes of severe type may occur in infancy, milder in childhood. Occurring with pancreatic disease, fatty stools do not appear.

**Prognosis:**—Acute cases may terminate in a few days or weeks. The older the patient when attacked, the slower the course, and the milder the symptoms. The obese bear the malady better than the lean. But the best results follow early recognition and skilful treatment, with patients obedient and capable of self-control. Too great severity will be followed by certain dietetic excess, with recurrences each more difficult to control, and the development of secondary maladies, degenerations, arteriosclerosis, neuroses, ocular affections, loss of teeth, etc. Gangrene appears in cases mild and chronic but neglected. The object of treatment is complete and permanent suppression of the glycosuria. When this is secured the toleration of carbohydrates rises gradually so that more can be assimilated without glycosuria appearing. These are "cured" though they are liable to recurrences.

Cases may be classed as severe when the glycosuria does not cease when CH is absolutely excluded from the diet, and even limiting the proteids may not succeed; also if not more than 50 grams of bread a day can be assimilated. Such cases rarely establish a tolerance for larger quantities, and what they have is lost. Acute infections lessen the assimilative power, at least temporarily. Severe forms are incurable and we seek only to check the progress. Even with large loss of sugar and constant acidosis life may be prolonged for years. Coma is bad—80 per cent of severe cases die of it; 3 per cent of gangrene, the others of intercurrent maladies. Of mild cases 5 per cent die of coma, over 20 per cent of gangrene.

Innutrition is one of the chief dangers. Nuclein destruction is a second, acidosis a third in severe cases, and the lessened resistance renders intercurrent affections more fatal. Wounds of diabetics do badly and necrosis is frequent. The skin is very vulnerable, phthisis is common, old age comes prematurely, neuroses and arterial affections are common.

**Diagnosis:**—This is made by study of the causes, the gradual onset, with progressive debility, impotence, symmetrical sciatica, cataract, boils, increase in micturition, and persistence of sugar in the urine. The dietetic and methylene tests have been mentioned.

The authors have not deemed it desirable to give the methods of testing the urine for the presence of sugar, the limits of this work forbidding them. These matters are treated in text books on chemistry.

**Prophylaxis:**—This may be applied in families where diabetes is hereditary, and when transitory glycosuria appears without being preceded by the excessive use of sugar; such patients should be advised to limit the use of carbohydrates, closely limiting that of sugar or abstaining from it altogether. The urine should be frequently examined, and not the morning urine but that taken from the entire day. Excess of carbohydrates lessens

the power of assimilating them; restraint in their use increases assimilation; otherwise the ordinary rules of personal hygiene apply.

**Etiological Treatment:**—Neurogenous glycosuria is transitory but may be a precursor of diabetes; it should therefore be a signal for prophylaxis. It aggravates true diabetes, however, therefore pains should be taken to avoid disturbances. It is not an indication for removing the limitation of carbohydrates. The surroundings of the patient should be regulated so as to avoid such disturbances as will affect him injuriously.

Syphilis may cause glycosuria, or neurogenous glycosuria may develop in syphilitic; while antisyphilitic treatment will not rebuild tissues that have been destroyed, it may stop the progress of the disease in so far as the latter depends upon the syphilis. Diabetics are very sensitive to mercury, and it should be used with the utmost caution.

Pancreatic extracts have been recommended on the theory that the disease is due to a lack of pancreatic secretion. As to the diabetes proper, these extracts exert no beneficial effects; but they do aid in the digestion of fats, and prevent disturbances arising from insufficient pancreatic action in the intestines. Croftan has advised the use of mixed extracts of pancreas and muscles. Thyroid and suprarenal extracts seem to aggravate glycosuria; liver extracts have proved useless. The triumphs of organotherapy in diabetes lie still in the future.

**Direct Treatment:**—Opium has been long used. If full supplies of carbohydrates be allowed, opium is useless; but when the glycosuria has been reduced to its lowest point by deprivation of carbohydrates, opium will cause the last of the sugar to disappear. Von Noorden says that codeine is as effective as opium without being constipating. He gives from 2 to 2½ grains of either each 24 hours. Diabetics bear opiates well, becoming accustomed to them after a few days. The action of opium here is not understood; it may cut off the neurogenous and alimentary glycosuria. Hare claims that opium itself is more effective than codeine or morphine and since Von Noorden states that the same weight of opium is as effective as codeine, it seems evident that there is a curative principle in opium besides the powerful hypnotics. It would seem therefore, that there is room for a useful investigation of the numerous other active principles found in opium, as obviously any one of them that would prove efficient in diabetes without the disadvantages inseparable from the hypnotic principles would be of inestimable value. This very obvious study has yet to be made.

Of the salicyl derivatives, Von Noorden gives the first place to aspirin as it interferes least with the digestive organs. It is best suited to cases least amenable to opium; that is, slight cases, when the use of carbohydrates



is permitted. This remedy increases the power of assimilating carbohydrates, without increasing the glycosuria. The average daily dose of salicylic acid is 45 grains. The benefit is not uniform in all cases. Antipyrin has a similar but less decidedly beneficial action. Salicylic acid should not be used continuously, as it loses its beneficial influence, nor when the kidneys are diseased; but the salicylates and antipyrin are contra-indicated by gastric disorders.

In some cases jambul lessens glycosuria markedly for a few weeks, when its good effects cease. No case of cure has yet been credited to this remedy. Von Noorden recommends jambul and salicylic acid to be occasionally given for three or four weeks, when analysis shows that they lessen the glycosuria and increase the assimilation of carbohydrates. The diet should be strictly maintained at the beginning of the jambul treatment, small quantities of carbohydrates being introduced while it is being taken. All other drugs recommended as specifics for diabetes, including arsenic, cacodylates, strychnine and uranium, are condemned by Von Noorden as worthless. He devotes some attention, however, to the good results produced by faith in quack remedies, diabetics being a credulous people.

Many patients resort to health resorts, among which may be mentioned in Europe, Carlsbad, Vichy, Neuenhar and Homburg. The benefit is partly suggestive, largely due to the regimen. Temporary relief also follows the use of the alkalis which all these waters contain. Removal from stress and strain, with rest and outdoor exercise, careful regulation of the diet and the skill which comes from experience in the management of minor details, explain much of the relief following a visit to these resorts. The waters also may benefit complications; but there is nothing miraculous, or even mysterious in the benefit there obtained.

**Dietetic Treatment:**—If the glycosuria can be stopped for some time, without injury to the patient, the power of assimilating carbohydrates increases; if the glycosuria persists, this power decreases; it may decrease in spite of the best treatment, but it always declines more rapidly if dietary precautions are neglected, while degenerations continue. The most important point as to diet is the limitation or deprivation of carbohydrates. We have, however, to consider the appearance of acetone, the effect on the digestive organs, the general health and strength and the nervous system. The practical application of the diet therefore must be suited to the case. The treatment must be devised to suit the man, since the man was not constructed to suit the treatment; but in all cases the object must be the reduction of glycosuria to the smallest possible limit.

We begin by ascertaining how much carbohydrate the patient can tolerate. For this purpose Von Noorden devised a test diet. Foods are divided into

two groups, the principal articles which are practically free from carbohydrates, and accessory articles which contain the latter. His standard diet is as follows: Breakfast: 200 grams coffee or tea, with one to two tablespoonfuls of thick cream; 100 grams of hot or cold meat, as weighed after cooking; butter; two eggs with bacon; 50 grams of white bread.

Lunch: Two eggs cooked as desired without flour; meat, boiled or roasted; fish, venison or fowl, weighing when cooked 200 to 250 grams; vegetables, spinach, cabbage, cauliflower or asparagus, prepared with broth, butter or other fat, eggs or thick sour cream, but no flour; 20 to 25 grams creamy cheese, Camembert or Brie, plenty of butter; two glasses of white or light red wine if desired; one small cup of coffee, with one or two tablespoonfuls of thick cream; fifty grams of white bread.

Dinner: Clear meat soup, with egg or green vegetable in it; one to two meat dishes as at lunch; vegetables as at lunch; salad of lettuce, cucumber or tomatoes; wine; no bread; other drink during the day one or two bottles of aerated water.

The total urine excreted during 24 hours is collected, the day and night separately, and examined quantitatively for sugar; the excretion of acetone, oxybutyric acid, ammonia and nitrogen is also ascertained. If on this diet no sugar is excreted, the bread is gradually increased until sugar appears, when the bread is diminished. Changes are not made too rapidly for a proper estimate of their effects. If the glycosuria subsides while bread is still being taken, we are dealing with a slight form, and have ascertained the toleration of the patient. When the sugar only ceases when bread is totally excluded, we have the severe form. In each of these there are many grades. In most extreme cases, glycosuria continues when carbohydrates are totally excluded and proteids largely reduced.

We next study the influence of rest and of exercise, finding wide differences in various cases. The time at which carbohydrates are taken has its influence, some tolerating them later but not in the morning; others take carbohydrates better in small and frequent doses, while others do better by taking the whole quantity at one meal. Some patients tolerate some carbohydrates better than others—milk or fruit sugar better than starch for instance; oats or potatoes better than rye or wheat. The influence of drugs, alcohol and mineral waters is then to be ascertained.

In all slight cases the carbohydrates should be excluded for two or three weeks; by this means the toleration rises and degenerations are checked. Carbohydrates are then to be added gradually in accordance with the knowledge gained by our study of the case, the quantity always being kept below the limit of toleration. The rule must be imperative that no more glycosuria can be permitted in future. From time to time



the patients should abstain from carbohydrates for a week or two, the fat being increased to avoid debility; daily weighing is advisable to keep the process in due control. Loss of weight ought not to exceed one pound a week.

Nervous people not only bear this closely restricted diet well, but require it more imperatively than do other cases; the nervous symptoms are markedly relieved by it. In albuminuria the restriction period should not exceed three weeks; the proteids and extractives should not be excessive. The albuminuria often increases for a few days and then sinks, sometimes permanently disappearing. The appearance of acetonuria does not contraindicate rigid abstinence from carbohydrates. In a short time the acetonuria subsides; if, however, it becomes excessive, the diet must be modified and some carbohydrates permitted. Such cases should be treated in institutions. The individual question is so important that the diet lists of foods forbidden and permitted should be disregarded.

In severe cases 80 to 100 grams of bread is allowed daily and the proteids reduced until not over fourteen grams of nitrogen appear in the urine; after every fourth to sixth week, an eight-day or ten-day period of fully restricted diet should be enjoined. Careful attention should be paid to the reaction of the various proteids and carbohydrates. Meat should be restricted to 200 grams a day as weighed after cooking; egg and vegetable albumens are much better tolerated. Soon after beginning the restricted diet course, for two or three days the proteids are reduced to the utmost; abundance of alkali is then administered to prevent acidosis. Daily analyses are made of the urine. Longer periods of restriction should only be attempted in an institution until we have ascertained the effect of shorter periods on the general health, the glycosuria and the acetonuria. Enormous advantages are gained by restricting the diet for two or three weeks; but although the dangers of acetonuria are much exaggerated, the closest watch must be held over this symptom. After such a period of restriction we may allow 80 to 100 grams of the carbohydrate best tolerated to be consumed as best tolerated; the proteids must be held permanently low enough to restrict the renal excretion of nitrogen to 12 or 15 grams daily. This diet must be frequently interrupted by two or three days of complete abstinence from carbohydrates. This is to be regulated by the effect. Once or twice each year the longer period of restriction should be enforced with due precaution.

The question of sending patients to Carlsbad, or prescribing longer periods of restriction, is always an individual one, to be answered by observing the effects of shorter periods.



Von Noorden accidentally discovered that some patients did well on the free use of oatmeal gruel, 200 to 250 grams of oatmeal being given every two hours, with 200 to 300 grams of butter, 100 grams of vegetable proteid or a few eggs in addition. Nothing else was allowed, except black coffee or tea, lemon juice, wine or a little liquor. After three or four days this is followed by one or two "vegetable days". It is well to precede this treatment by a few days of restricted diet or one or two "vegetable days." At first the glycosuria increases, but in a few days diminishes, and the acetonuria even more so. The urine is nearly or entirely free from sugar, the results being better than those following complete restriction. The toleration of carbohydrates rises. These results, however, occur in but a few cases, but these were very severe forms, many occurring in children or young people. In slight cases the method always failed. Neither meat nor other carbohydrates can be allowed during the oatmeal treatment. Edema occasionally develops, but ceases when the oatmeal is discontinued.

Similar results have been asserted as following the exclusive administration of rice, of milk, and of potatoes. In some cases potatoes do better than the oat cure, but the latter suits more cases. The principle, however, of limiting the carbohydrates to one particular variety, at the same excluding meat, underlies all these methods. Some persons seem able to assimilate one carbohydrate better than any other. When we are fortunate enough to discover one such article as the patient can take with impunity, we have eliminated the dangers of acetonuria from that case.

#### I. EQUIVALENT TABLE FOR WHITE BREAD.

ARTICLE	PERCENTAGE OF CARBOHYDRATE	20 GRAMS OF WHITE BREAD REPRESENTS
Rye Bread .....	About 50 per cent	24 grams
Graham Brown Bread ...	45 "	26 "
Triscuit (Natural Food Co.) .....	70 "	17 "

#### II. SPECIAL BREADS FOR DIABETICS.

White bread .....	30 per cent	40 grams	The numbers give the average of numerous estimations.
Black bread .....	38 "	32 "	
Zwieback .....	45 "	26 "	
Oat cakes .....	65 "	18 "	
Graham bread .....	28 "	45 "	
Almond bread (Dr. Lampe) .....	10 "	120 "	

#### III. PARISIAN BREADS FOR DIABETICS.

Soya bread .....	14.4 per cent	80 grams
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#### IV. COCOA.

Pure cocoa powder .....	30 per cent	40 grams
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#### V. NATURAL FLOURS AND MEALS.

Wheat, rye, barley, oat maize, buckwheat, millet .....	75 to 80 per cent	15 grams
Beans, peas, lentils .....	38 "	20 "
Soya beans .....	48.5 "	25 "
Gluten meal .....	7 "	170 "

VI. STARCH FLOUR.			
ARTICLE	PERCENTAGE OF CAR- BOHYDRATE	20 GRAMS OF WHITE BREAD REPRESENTS	
Potatoes, wheat, sago, rice, sago, maize, mandarin ...	82 per cent	14 grams	
VII. PREPARED MEALS.			
Vermicelli .....	80 per cent	15 grams	
Macaroni .....	80 "	15 "	
Vermicelli, macaroni for diabetics .....	55 "	22 "	
VIII. CEREALS.			
Oats .....	60 per cent	20 grams	
Rice .....	70 "	17 "	
Barley .....	66 "	18 "	
IX. PULSES.			
Fava, lentils, beans .....	53 per cent	23 grams	Dried seeds.
Fava, beans, broad beans	30 "	40 "	In fresh condition.
X. TUBERS.			
Potatoes (summer) .....	16 to 18 per cent	70 grams	
Potatoes (winter) .....	20 " 22 "	100 "	
Celery .....	12 "	100 "	
XI. FRESH FRUITS.			
Sweet cherries .....	10 to 12 per cent	100 to 200 grams	
Sour cherries .....	8 " 10 "	120 " 130 "	
Malberries .....	10 " 12 "	100 " 120 "	
Apples .....	8 " 10 "	120 " 150 "	
Pears .....	8 " 10 "	120 " 150 "	
Strawberries .....	5 " 7 "	170 " 240 "	
Gooseberries (ripe) .....	7 " 8 "	150 " 170 "	
Gooseberries (unripe) .....	2 " 4 "	500 "	
Black currants .....	6 " 8 "	150 " 200 "	
Apricots .....	4 " 6 "	200 " 300 "	
Peaches .....	4 " 6 "	200 " 300 "	
Raspberries .....	4 " 5 "	240 " 300 "	
Bilberries .....	5 "	240 "	
Blackberries .....	4 "	300 "	
Cranberries .....	1 " 2 "	600 " 1200 "	
Pineapples (very sour) .....	8 "	150 "	
Spanish oranges .....	1.5 " 2 "	600 " 900 "	
Spanish oranges .....	2.5 " 3 "	400 " 480 "	After cooking.
Oranges .....	5 " 6 "	200 " 240 "	Weighed, unpeeled, Jan. and Feb. Weighed, peeled, Jan. and Feb. March to May, chiefly laevulose.
XII. MILKS.			
Milk .....	About 4.5 per cent	About 275 C. c.	
Sour cream .....	2.5 to 3 "	400 to 840 "	
Sour milk .....	About 4 "	About 300 "	
Kephir .....	" 2.5 "	" 480 "	Numerous analyses.

TABLE I.

The following foods may be consumed by all diabetics in as large quantities as they may desire. If it be desirable, however, to limit the intake of proteids, the foods containing large amounts, such as meat, cheese and eggs, must be used sparingly if at all. Some diabetics cannot take spices.

Fresh meats, muscular tissues of birds and animals, braised, boiled or roasted, with gravy, butter, meal or flour, mayonnaise, or other sauces without flour, warm or cold; tongue, heart, lungs, brains, calf's spleen, kidney, marrow, calf's liver, game and poultry, not to exceed 100 grams weighed after cooking; the feet, ears, snout and tail; dried and smoked meats, smoked and salted tongue, pickled meats, ham, bacon; canned meats and all sausages if free from flour; somatose, casein, meat extracts;

all fresh and salt water fish if served with sauce containing no flour or bread crumbs; dried, salted or smoked fish, pickled herrings, fish in oil and caviare; shellfish, lobster, crab, turtle, crawfish; Worcester and all other sauces; eggs; any animal or vegetable fats, pure cream, sweet or sour.

None of the baked foods are free from carbohydrates. Gluten and almond breads are useful if carbohydrates can be excluded in their manufacture.

Fresh vegetables, lettuce, endive, cress, dandelion; aromatic herbs, leek, garlic and celery; gherkins, tomatoes, young green beans, vegetable marrow, onions, radishes, sea-kale; root artichokes in slight cases only; asparagus, Brussels sprouts, chicory, rhubarb, celery stalks; cauliflower; burr-artichoke; spinach, sorrel, cabbage, beets; fresh mushrooms; green gooseberries sweetened with saccharin; pickles, olives, sauerkraut; all spices; soups made with meats and green vegetables; desserts made from eggs, cream almonds, citron and gelatin, sweetened only with saccharin; all spring and seltzer waters; good liquors; any dry wine, such as Bordeaux, Burgundy, white Rhine and Mosel; tea and coffee with cream, but no sugar; a little cocoa if well boiled; lemonade sweetened with saccharin or glycerin.

TABLE II.

This table contains foods which have a very little carbohydrate. They are not permissible during strict dieting but are useful when we begin to relax and test the increase of toleration. The quantity of each one allowed must be prescribed.

Vegetables cooked without sugar or flour.

Dried beans or peas, a tablespoonful.

White and red turnips, carrots, celery root.

Canned peas and beans;

Lima beans, two tablespoonfuls.

A tablespoonful mashed or fried potatoes.

Nuts up to 50 grams.

French apples, pears or apricots, 50 grams.

Raspberries, strawberries, black currants, a heaping tablespoonful.

Wild raspberries or blackberries, two tablespoonfuls.

Bilberries, three tablespoonfuls.

Fruits cooked with saccharin and no sugar.

Plums, apples, pears, apricots, peaches or sour cherries, a heaping tablespoonful.

Black, goose, or raspberries, two heaping tablespoonfuls.

Dried plums or peaches, when swollen with water, a heaping tablespoonful.



Milk, a deciliter (3 1-2 oz.).

Levulose chocolate or cocoa, unsweetened, 10 grams.

Foods rich in carbohydrates cannot be used at all during rigid dieting; as this is relaxed they may follow those in Table II, the quantities being dispensed by weight and the effect closely watched. We may give 100 grams of white bread or its equivalent in other starches, using that form which each patient tolerates best.

Dr. Heinrich Stern has recently in the *Medical Record* directed attention to two forms of gangrene occurring in diabetes. The idiopathic form is due to sclerotic disease of the blood vessels interfering with the circulation. This is a dry gangrene and should be kept dry; time should be allowed such cases under antidiabetic regimen to form a line of demarcation.

The inflammatory gangrene results from the attacks of virulent microorganisms upon tissues vitiated by deficient nutrition and autotoxic processes. This occurs only in grave forms of the disease. In both forms the best prophylactic is the suppression of glycosuria; hygienic measures are important. The slightest elevation of temperature calls for immediate operation, from which, however, little is to be expected where the vitality is so low and the septic condition so marked.

Among the remedies which have been credited with more or less control over the progress of diabetes are to be mentioned arsenic bromide, guaiacol, iodides, lactic acid, glycerin, glonoin, creosote, quinine, lithia salts and strontium lactate. Some of these act as intestinal antiseptics and the benefits resulting from such agents, while universally admitted, have not yet been determined accurately. Others relieve certain symptoms or combat certain ill tendencies. The writer secured good results from strontium lactate in the earlier stages of the malady. It seems unlikely, however, that any specific will ever be found for this disease and that we must continue to treat the diabetic rather than diabetes.

## DIABETES INSIPIDUS

In this disease there is excessive thirst and correspondingly the urine being of low specific gravity and containing no albumin. No characteristic lesions have yet been noted; lesions of the kidney sometimes noted is as likely to be a result as a cause. The bladder, ureters and pelves of the kidneys may be distended. The quantity of fluid discharged through various ways may be enormous.

**Etiology:**—Among the causes have been noted nervous shock, or injury, lesions of the floor of the fourth ventricle; nerve paralysis; acute infectious diseases; intemperance in beer; hereditary influence; age, occurring in childhood and even congenitally; most cases occur in males.

**Symptoms:**—The disease may be termed a vasomotor or centric, sometimes reflex. Unless it follows shock the onset is insidious. The quality of urine excreted daily may reach sixty pints, specific gravity being correspondingly low. The total excretion of water is somewhat increased; the thirst is incessant; the appetite little if any. The skin and mucosa are dry as in diabetes. The other symptoms are scanty. Nutrition is well maintained. Remarkable tolerance has been noted. Neurasthenia, insomnia and chorea are common.

While most cases recover, the course is irregular. Whether it is from an intercurrent disease, or from the fatal character of the causal lesion.

**Diagnosis:**—We do not find sugar or albumin as in diabetes and nephritis; hysteria has its numerous accompanying symptoms; if other disease shows the enormous thirst and urination with the characteristics of the urine above noted.

**Treatment:**—The patient should be induced to rest as closely as possible. The laws of personal hygiene should be observed in all respects. Pilocarpine in doses sufficient to cause profuse sweating proved beneficial. Zinc valerianate usually controls nervousness. A continuously astringent effect may be exerted upon the kidneys by the administration of arbutin, gr. 1-6 every hour while it lasts. We believe is better than the preparations of ergot; but there is evidence that full doses of ergotin powerfully check the polyuria.

Burggraef recommended strychnine, 6 to 8 granules a day.

Feilchenfeld reports that marked decrease in the amount of urine excreted with specific gravity unchanged occurred after the administration of nine nitrate, gr. 1-25 to 1-12.

pathogenesis of gout we find (Garrod); by increased uric acid (Haig); excessive production of crystalline biurate of uric acid ferment (Von Noorden); deposits in tissues less soluble than bases at the expense of the kidneys from urea and uric acid and neurotrophic disturbance. It is probably presartric acid.

It attacks cartilages and synovial membranes, and excite inflammatory reaction and loss of motion. Tophi may be absorbed. They have been found in the ear, eye, nose, eyelids; in the joints and many other localities.

It is preceded by acute inflammation. It is characterized by areas of necrosis, and granular degeneration of the cells. It is one of the most common causes of chronic bronchitis, asthma and emphysema. It is more common in men than acute respiratory

disturbance. The malady rarely occurs in children. It is usually powerful and the disease is the malady. After the 50th year of life, men frequently suffer the arthritic attack, of animal foods, with excessive use of alcohol, especially of wine, and the habits and customs of the country. Workers in lead are especially liable to the acute outbreak.

It is characterized by excessive disturbances of the nervous system, such as disturbed sleep, irritability of temper, and depression of spirits. The excretion of uric acid is increased.

In the early morning, the pain is usually at the angular joint of one great toe, which is crushed in a vice—the joint is red, swollen, tenderness, heat and



inflamed, the malady going on with temporary improvement until hard nodules are formed and the fingers become knobbed.

An acute form occurs rarely, before the age of thirty. It follows puerperal conditions; the arthritis is multiple, the inflammatory symptoms marked, with a good deal of swelling within the joints. A chronic affection in children described by Still shows progressive enlargement of the joints, the spleen and lymphatics. The inflammatory symptoms are marked, the course of the disease slow.

**Diagnosis:**—In rheumatism the large joints are first affected; it changes from one joint to another and leaves no deformity, but a tendency to heart disease; in all these respects rheumatism differs from all forms of the malady under consideration. Arthritis of the shoulder joint sometimes occurs, with pain, infiltration of the ligaments, wasting muscles and sometimes neuritis. It ends in recovery.

**Prognosis:**—Rheumatoid arthritis does not seem to endanger life; sometimes cases improve and sometimes the progress of the malady stops.

**Treatment:**—Anders recommends cod-liver oil and especially iodine and arsenic; the iodide of arsenic may be given, in doses of gr. 1-67, three times a day to an adult, increased until toxic action is evident in irritation of the eyelids. The doses should then be held as closely as possible to this point without actually touching it, and the remedy continued for many months. Dry hot air has also been advocated. Bannatyne advised guaiacol carbonate pushed to and held at full toleration. Cold compresses locally relieve acute symptoms, and with massage promote absorption of debris.

The most hopeful publication the writer has seen concerning the treatment of this disease, was a paper by Prof. Craig in *The Alkaloidal Clinic*. Prof. Craig and his wife were both victims of this malady. His treatment, which was very successful, consisted in keeping the bowels clear and aseptic, and restricting the diet closely, avoiding meat, all acid fruits and other acid foods. Since progressive cases are attended with disturbance in the stomach and bowels, it seems rational that we should there direct our principal treatment.

## GOUT

Gout is now defined as a form of perverted nutrition, with the formation of uric acid and attacks of acute arthritis, sometimes with urate deposits. It is probable that there are present an excessive absorption of nutritives, disordered metabolism and defective elimination.

Among the various theories concerning the pathogenesis of gout we may mention the following: Excess of uric acid (Garrod); by increased formation and less elimination, lessened alkalinity (Haig); excessive production of uric acid (Ebstein); precipitation of crystalline biurate of sodium (Roberts); tissue-necrosis from an assumed ferment (Von Noorden); defective renal function (Klemperer); urate deposits in tissues less alkaline than blood (Morhorst); increase of xanthin bases at the expense of uric acid (Kolisch); formation of uric acid in kidneys from urea and glycocin (Luff); inherent morbid metabolism and neurotrophic disturbance (Duckworth). The elements that seem to be most probably present are deficient renal elimination and excess of uric acid.

Sodium urate is deposited in the ligaments, cartilages and synovial membranes. These when dry are termed tophi, and excite inflammatory processes, resulting in thickening, deformity and loss of motion. Tophi may be discharged by ulceration, or in time be absorbed. They have been recognized in the cartilages of the ear, larynx, nose, eyelids; in the palmar periosteum and tendons, the penis and many other localities. The lesions of an acute attack are those of any acute inflammation. Deposits occur in the kidneys, followed by areas of necrosis, and granular contraction frequently results. Gout is one of the most common causes of arteriosclerosis, with cardiac implications. Chronic bronchitis, asthma and emphysema are more common sequels than acute respiratory affections.

**Etiology:**—Heredity exerts a powerful influence. The malady rarely begins before middle age, unless heredity is unusually powerful and the habits strongly favor the development of the malady. After the 50th year primary attacks are rare. Men most frequently suffer the arthritic form, women from irregular gout. Over-eating, of animal foods, with a sedentary life, is the potent cause. The use of alcohol, especially of malt liquors, sweet and fermented wines, hence the habits and customs of the wealthy, strongly dispose to gout. Workers in lead are especially affected. Finally, traumatism may occasion the acute outbreak.

**Symptoms:**—Patients complain of digestive disturbances, wandering pains, muscular cramps, asthma, insomnia or disturbed sleep, depression, but more frequently of general unrest and irritability of temper. Sometimes the warning comes in a sense of well being. The excretion of uric and phosphoric acids is diminished.

The attack occurs generally during the early morning, the patient awakening with pain in the metatarsophalangeal joint of one great toe, which increases till unbearable, feeling as if crushed in a vice—the pain of confined fluid. The part swells, with redness, tenderness, heat and



loss of motion. The surrounding skin pits and becomes shiny. The temperature rises to 102—103, and the patient shows excessive irritability. In one or two hours the symptoms subside, free sweating occurs, and great is the relief. The evidences of inflammation do not vanish, and on the following night the story is repeated, with emphasis. This goes on for a few days or a week, when the attacks moderate, the skin peels off, and free movement becomes possible. Usually there follows a delightful sense of well-being, mental and bodily, and the patient will tell the doctor that all the "meanness" has been cleared away from his system.

The recurrence of attacks depends largely on the patient's habits; usually they tend to recur more frequently, though the attacks may be less severe. Other joints are involved. Suppuration does not follow.

Sometimes the local symptoms suddenly disappear and simultaneously evidences of disease of some internal organ appear, acute pains in the stomach, heart, brain, or elsewhere, with symptoms of acute inflammation there. This is known as retrocedent gout. Such attacks may prove fatal.

As the malady becomes fixed the attacks grow milder, longer, until they become continuous. Other joints are affected, the hip and shoulder excepted. The deposits interfere with motion; the skin over them may ulcerate, so that the patient may be able to write on a blackboard with the chalky deposits. Much distortion results.

Among associated conditions are catarrhal gastritis, arteriosclerosis, cirrhotic kidney, cardiac sclerosis, etc. The course is diversified by acute attacks and intercurrent complications, or by uremia.

All cases manifested elsewhere but in a joint are termed irregular gout. These are seen in women and men who inherit gout, but not in the most marked degree. It less frequently occurs in men who have had the regular form and have mended their habits, but not quite enough. We may then have pains in the joints and muscles, worse in the early morning, with arthritic inflammation of subacute grade; digestive difficulties, tonsillitis, parotitis, pharyngitis, pericarditis, arteriosclerosis and cirrhotic nephritis; headaches, neuralgias, paresthesiæ, palmar and plantar pains, hot itching eyeballs, atheromatous apoplexy, basilar meningitis, neuritis, irritability of temper and even mental aberrations; scanty red urine, uric showers, gravel, glycosuria, oxaluria, cystitis, hematuria, urethritis, prostatitis, orchitis; bronchitis, asthma, emphysema; eczemas and other cutaneous irritations; ocular inflammations, hemorrhagic retinitis, glaucoma; affections of the external ear.

**Diagnosis:**—Acute gout first attacks the small joints, especially the great toe; does not wander from joint to joint; the tenderness on trans-



verse pressure is greatest over the condyles; the history points to gout; tophi may always be found; the fever is slight; cirrhotic nephritis with high vascular tension develops; the joints in time are distorted; the blood serum may show the uric acid test. Acute rheumatism affects the large joints first; wanders; tenderness is greatest in the tendons over affected joints and is great in the skin; the history differs; fever is higher; the kidneys are not affected, nor does arteriosclerosis raise the tension. Arthritis deformans is not hereditary to gout, affects women and the poor, is excited by nervous causes, commences in the fingers and develops symmetrically, is more regularly progressive, shows marked deformity from exostoses and ankylosis, and is not marked by uric acid excess.

**Treatment:**—The greater the hereditary tendency to gout, the more decided should be the preventive regimen. Alcohol should be totally forbidden, the patient made as nearly vegetarian as possible, active outdoor exercise required, tea, coffee and tobacco prohibited, and daily bathing enjoined. Children thus trained usually escape. Care must be taken, however, not to injure the patient's health in the zeal for reform. Anemia is to be avoided as well as plethora. Climate and clothing are to be suited to the case.

The diet of gouty individuals should be carefully arranged with reference to the patient, and hence great latitude is necessary. But it is always wise to limit the use of proteids to the needs, and to avoid those meats that experience has shown to be most injurious. Articles to be permitted are the green vegetables, farinacea except oatmeal, fruits except bananas, tomatoes and strawberries; oysters, milk, eggs and fats; most fish, but not salmon, herrings, sardines, mackerel, halibut, codfish or flounder; the white meat of chicken; stale bread. Articles to be avoided are alcohol, tea, coffee, hot bread, pies and cakes, sweet puddings, cheese, dried beans or peas, dried or smoked meats, pork and veal, goose or duck, and all highly seasoned dishes. If more meat must be allowed it should be beef or mutton. Patients who are so accustomed to rich food that they languish if deprived of it, or become rebellious, may be satisfied by giving them fried egg-plant, tomatoes, cucumbers or apples. In general all vegetables containing volatile oils should be excluded, such as water-cresses and the whole onion tribe.

The free use of alkaline mineral waters is nearly always commendable. They are best taken between meals, on rising and on going to bed.

Colchicum has long been known as the most effective agent to promptly relieve the acute attack. Unfortunately the pharmacopoeias listed two fluid extracts, two tinctures and two wines, each with a different dose, and all so variable that they were practically useless. The pharma-

copeia now, however, has listed colchicine, the active principle upon which the virtue of all these preparations depended; and the rapidly increasing use made of this alkaloid testifies to its value. Unfortunately colchicine is extraordinarily slow in its action, though it does not require fourteen hours like the older preparations; It is necessary to administer colchicine until unmistakable evidence of its action is presented in the shape of nausea or diarrhea. The dose of gr. 1-134 may be given dissolved in hot water every three hours until the above symptoms are manifested. Coincidentally with these effects the gouty pain and inflammation subside. It is well to give the patient at the same time an abundant supply of alkaline beverages, the salts of lithia usually being preferred. The application of hot flannels or a solution of iodoform in ether as a liniment affords notable relief from the acute suffering.

During the intervals colchicine should be continued, a single dose being given at bedtime sufficient to act slightly upon the bowels in the morning. During the acute attack the bowels should be completely emptied by saline laxatives, repeated daily; and during the intermissions the patient should take a moderate dose of podophyllotoxin at bedtime with a saline next morning.

While colchicine is less markedly beneficial in chronic and irregular gout, it is nevertheless our best remedy. Calcalith (calcium carbonate) has proved of great benefit when given well diluted with water, neutralizing uric acid and carrying it out of the body. Whenever vascular tension is raised, as it so frequently is in chronic gout, veratrine should be added to the other treatment in doses sufficient to subdue tension to the normal standard. This is also an excellent alternant for colchicine and the best substitute for the latter when for any reason it may be inadvisable. Anemic patients require the usual treatment of that affection, while in all forms of the malady scrupulous care must be given to keeping the bowels clear and aseptic, the elimination fully up to the standard. The greater the failure of renal elimination, the more imperative it is that the unavoidable work of these organs should not be unnecessarily increased by improper diet.

## LITHEMIA

In lithemics there is an excess of uric acid which increases more rapidly than it is eliminated. The causes are those of gout, namely, a sedentary life and the use of foods, especially proteids and sugar, to a greater extent than the needs of the body justify. Lithemia in America seems to replace gout in England. The different manifestations resulting from the operation of identical causes may in part be explained by the difference in



climate; but as the effects of inherited wealth are transmitted to succeeding generations in America, we find typical gout growing more frequent.

**Symptoms:**—These are in many cases identical with those already described under the head of irregular gout. We find in lithemia, however, a special irritability of the genitourinary mucous membrane, in which slight causes induce inflammation which proves obstinate and not readily amenable to treatment. Dyspepsia in some form is almost always present, generally with acidity, heartburn, pyrosis and flatulence. The starches are not well digested, and indulgence in sugar is especially likely to cause acute indigestion.<sup>1</sup> The breath becomes offensive; the bowels are disturbed, the stools offensive and unhealthy and hemorrhoids are frequent. Palpitation and other neurotic heart phenomena are common. The skin is dry and irritable; itching is exceedingly common; the nails become brittle, the teeth decay early, and the hair falls prematurely. Toxemic headaches are very common indeed. Vascular tension is generally increased. An enormously long list of symptoms has been attributed to uric acid. It is now known, however, that uric acid is not the *materies morbi* and that most of these difficulties can be attributed to absorption of the products of fetal decomposition. Nevertheless, it is convenient to retain the name since the profession and the public have been educated up to quick recognition of the conditions incident to a lazy, indulgent life, and the means of remedying them.

**Treatment:**—The treatment should begin by instructing the patient in the art of eating: He should be taught what to eat, when to eat and how to eat; the diet should be regulated by the physiologic needs instead of by the appetite. Exercise should be enjoined; at first in strict moderation, carefully avoiding muscular strain and over-fatigue. As the patient's muscles become trained and developed, their work should be increased and varied, the results being carefully noted until the balance between that particular patient's needs of daily exercise as well as of daily food has been determined. The diet is practically the same as that recommended for gout; the free use of alkaline waters between meals is to be commended but quite frequently it will be found necessary to administer hydrochloric acid with the meals. The bowels must be kept clear and aseptic; a moderate morning dose of saline in a half pint of hot or cold water is advisable. Calcium carbonate is perhaps the best diuretic and uric acid solvent in existence. Sometimes the liver is sluggish, when bile is indicated; and sodium sulphocarbolate should be given whenever the stools are offensive, in doses of five grains after meals, increased to whatever quantity may be needed to render the stools odorless. As an almost invariable rule the digestion is so weak that artificial digestants



will be required, while at the same time the use of cold drinks at meals must be absolutely forbidden. It is much easier to lay down the correct regimen for each patient than it is to induce them to adhere to it as long as may be necessary. As a rule it is best to use radical measures and urge upon the patient the wisdom of changing his occupation to whatever may seem ideally suitable to his particular case.

## RICKETS

This is a disease of early childhood, affecting the bones and cartilages and causing deformity. Nutrition is retarded and the growth of parts of the skeleton checked. The ends of long bones soften, the bone already deposited being absorbed. The ossifying layers become soft and thickened, the periosteum loose; cartilage cells proliferate, and the fontanelles remain open or even enlarge, forming areas known as craniotabes. The percentage of lime in such bones is quite small. The liver and spleen enlarge, and sometimes the mesenteric glands.

**Etiology:**—It is said that over 75 per cent of children born in Vienna show evidences of rickets. The erudite professors of the medical schools of that city, however, are usually drawn from other localities. Many such children are stillborn; those that survive childhood being dwarfs. Heredity has some influence but not as a rule directly, the mother being rather the victim of ill-health, over-work and under-nutrition, lack of fresh air and sunlight, perhaps syphilitic, and her health further deteriorated by nursing. Phthisis in either parent may aid the causation of rickets. It is a disease of cities rather than of the country; of Europe rather than America. In this country the majority of cases is furnished by the negro. It occurs among the poor, living in densely crowded, badly ventilated, dark tenements; more frequently among children brought up by hand, and especially if the milk is sterilized. A diet poor in proteids and fat is apt to develop rickets. The disease generally appears between the ages of six months and two years.

**Symptoms:**—The onset is usually unnoticed. We have first symptoms of disordered stomach, the food disagreeing with the child; its sleep is disturbed; the child is restless and irritable, has slight fever, perspires about the head especially when asleep, and tries to throw off the bed-clothes. Tenderness occurs, with languor, so that the child dislikes to move or to be handled. The mother complains that the child, which had sat up strongly, now hangs its head as if unable to sustain its weight; it cries when compelled to sit up. A diarrhea commences then, not offensive nor very prominent but remarkable in that it resists the ordinary

domestic remedies and grows worse on opiates. It becomes lienteric also, the food passing through undigested. The child loses flesh and becomes anemic while the white cells usually increase in number.

The check of development of the face makes the cranium appear enlarged. The sutures and fontanelles remain open, sometimes for years. Craniotabes occurs in infants under a year. It is caused by pressure from within and without, and is seen in bones on which the weight rests, such as the occiput, which is thin and soft. Palpate lightly, away from sutures. Crainosclerosis, abnormal hardness, sometimes occurs. The head is square, flat on top, bony thickening sometimes making the parietal and frontal bones prominent. The blue veins show plainly, and the hair is scanty and rubbed off the occiput. A systolic murmur may be detected over the anterior fontanelle. The teeth eruption is delayed, and they are ill-formed. The costal ends of the ribs swell forming the rachitic rosary, which may persist till the fifth year. The chest is flattened at the sides, pushing the sternum forward—pigeon breast. Harrison's groove is a furrow passing from the anterior end of the ninth or tenth rib toward the axilla, more evident during inspiration. At the junction of the shaft and epiphysis of the radius a swelling occurs, and both bones may be twisted out if the child crawls. Both ends of the clavicle club, and the scapulas may enlarge. If the spine is affected deformity may result.

The rickety pelvis offers the most serious of obstetric problems, the diameters being so diminished as to render cesarean sections necessary. The bones of the legs give way to the child's weight, and bow or angulate. The joints are large and the bones short and thick, so that the patient remains of low stature.

Children affected with rickets are specially prone to spasmodic croup, tetany, convulsions, and dyspeptic disorders. The abdomen projects, the lungs are ill-developed and the bones break easily with green-stick fractures. The writer has noted among such children a tendency to Raynaud's disease, Addison's disease, and to alcoholism—possibly coincidences. But any devolutional processes may be expected in these unfortunates, especially an unstable nervous equilibrium. One such family displayed among the numerous children tetany, Raynaud's disease, genius and eccentricity rather closely allied to insanity, extraordinary physical strength, a tendency to vasomotor perturbations, and a curious case in which the typical symptoms of Addison's disease were spread over a period of ten years, ending in pulmonary tuberculosis.

**Diagnosis:**—The typical diarrhea, lienteric, the difficulty in supporting the head although the child had previously sat up strongly, the sweat-



ing about the head during sleep, restlessness, delayed closure of the fontanelles and eruption of teeth, are significant. In later life the deformities are characteristic. It is important that the diagnosis be made early that the malady may be promptly checked.

The prognosis depends mainly on the doctor—if he recognizes the disease soon and institutes proper treatment it is easily managed.

**Treatment:**—This should begin with the pregnant mother, who should be placed in suitable hygienic conditions, with abundance of fresh air and nutritious food, enlivening social surroundings, and not too much work. She should have an abundance of lime salts in her food—the writer specially advises oatmeal scones, not porridge. Cod-liver oil, iron, manganese, calcium lactophosphate, and particularly attention to the bowels and kidneys, are useful in appropriate cases.

The child must have fresh air, sunlight, proper food properly digested, a plentiful supply of lime, and diastase to digest the starches. The lactophosphate of lime is soluble in water, and probably is more readily disposed of by the digestive and assimilative organs than any other lime preparation. Five to ten grains a day should be given, in the food. The diet must be carefully arranged with reference to the child's age and digestive capacity. Cod-liver oil is a useful addition. The diarrhea is often controlled better by diastase than by any other remedy, though copper arsenite, gr. 1-1000 to 1-5000 every two hours, is quite effective in lenteria. The best intestinal antiseptic here is calcium sulphocarbolate, which may be given up to full toleration with benefit. A child in its first year will take a grain every hour with ease. Phosphorus has been urged by many, and seems really effective. Zinc phosphide may be employed in doses proportioned to weight, the dose for an adult weighing 150 pounds being gr. 1-6 four times a day. It must not be continued more than one week out of each month. During the remainder of the month the child should take neuro-lecithin in full doses. The ordinary tonics given indiscriminately are worse than useless. None should be given unless there is a clear indication for that particular agent, and watchful care is necessary as even a needed tonic may pass through the bowels unutilized. Hot salt baths are most useful, followed by rubbing the entire body with hot cod-liver oil—the real thing, as odorous as it is possible to obtain. Fresh fruit juices are useful, and meat juices such as red dish gravy. Predigested milk is generally better than the plain, unless it can be given warm from the cow. The stools must be closely scrutinized as the food is always apt to pass undigested.

The child should not be permitted to sit up, or crawl, or walk, as long as there is danger of the soft bones giving way and bending. The



position should be changed often to prevent the occiput flattening or being dislocated under the edges of the parietals.

Of the above treatment the hygienic part is essential, the rest adjuvant.

## SCURVY

Scurvy is a malady that is apt to be overlooked because we generally think of it as one that used to affect sailors before ships were required to carry limejuice. In fact, scurvy is likely to affect our own patients, even in the wealthier classes, under proper conditions; and the writer believes that some of the debility of convalescence from continued fevers, too rigidly dieted, is really scorbutic. Under similar conditions a member of the faculty of one of the most prominent medical universities in this country was found to be suffering with scurvy.

While the causes of scurvy are well known, the pathogenesis is obscure and will be until we know more of the role played in the organism by the vegetable acids and other elements of our food. The blood is thin, dark, deficient in hemoglobin and red cells, prone to slip out of the vessels, especially under the periosteum of the femur.

**Etiology:**—The occasional occurrence of epidemics indicates the infectious nature of the malady. Testi and Beri claim to have isolated a diplococcus which produced in animals symptoms resembling those of human scurvy. The chief factor in the development of this disease is the absence of fresh vegetables from the diet for prolonged periods. The organic potassium salts, the hydrochloric acid and the total acidity, are thereby reduced. This may open the way to the invasion of microorganisms against which the body is ordinarily protected by the food elements derived from fresh vegetables. All debilitating influences, bodily and mental, favor the development of scurvy.

**Symptoms:**—The onset is slow. The loose tissue about the eyes looks swollen and bluish, the face pale and apathetic, and the patient finds himself growing weak and disinclined to physical or mental exertion. The bones, joints or muscles ache and dyspnea arises. Wasting follows. The gums become soft, spongy and swollen, ulcerate, bleed readily; the teeth loosen and fall; the breath is offensive even if there is no necrosis of teeth or bone; the tongue is pale, flabby and swollen; the appetite is languid, though digestion is fair, but easily disordered by too much food. Constipation is more common than diarrhea. Dysentery occurs in hot seasons and latitudes. The skin is dry, muddy or sallow, sometimes chlorotic. Hemorrhages occur under the skin and mucosa; around hair follicles, and under the periosteum. Brawny induration appears in the

calves and thighs. Epistaxis and other mucous hemorrhages are frequent, and blood may be effused into serous cavities. Tenderness develops in many places. The heart becomes weak, palpitates, affords anemic murmurs; the temperature is subnormal unless some inflammatory malady causes fever. The patient is depressed, apathetic, sleeps poorly, and may develop delirium, and day or night blindness. The urine is red, heavy, albuminous, rich in phosphates, the other solids diminished. Nephritis may follow. The bones may necrose, old scars break down and wounds reopen. Bedsores form readily. The tissues are particularly prone to fall into abscess or necrosis from slight pressure or traumatism.

**Diagnosis:**—This rests on the history of deprivation of fresh vegetables, the affection of the gums, apathy, debility mental as well as physical, hemorrhagic tendency, and prompt improvement following reform of diet.

The prognosis is good enough if the remedy is accessible and the disease has not occasioned destruction of tissue. Pulmonary and renal lesions may be grave.

**Treatment:**—The tin can has extinguished scurvy in modern armies and navies. Any fresh plant food will prevent or cure the disease. Sailors in the Antarctic gather any green plant they may find on the islands and prepare it as a tea or as spinach. Even fresh meats have their influence, and the raw blood of a seabird has saved life. Raw eggs and milk have been found beneficial. Even raw fish have stayed the progress of scurvy. While all fruits and vegetables are useful, it seems that there is more value in these when taken raw and unpreserved. It is useless to specify lemon or orange juice as any other answers as well. It is what is to be had that cures in emergencies. During sieges men have kept scurvy off by drinking teas made from grass or any non-poisonous weeds.

A little hydrochloric acid with meals is useful, and seems to restrain the tendency to disintegration of the tissues as well as securing better digestion. Constipation is relieved by enemata or salines; diarrhea by antiseptics; the mouth may be treated by lotions of any astringent and any potash salt, or any antiseptic in mild solution. Hemorrhages are more amenable to tannic acid than to mineral astringents. Tannic acid internally has a little effect in delaying the necrosis of tissues. The vegetable acids, citric, tartaric, malic, acetic, and their potash salts, have less effect for good than the vegetables containing them.

We do not know quite all there is as to the physiology of digestion and the uses our bodies make of various food elements.



## INFANTILE SCURVY

While this malady generally coexists with rickets it sometimes occurs alone. Hemorrhages occur beneath the periosteum, forming tender swellings, the muscles are infiltrated, and the lesions of rickets appear. The general view is that while the disease resembles rickets the exciting cause is different.

Infantile scurvy occurs in hand-fed children, sometimes following the use of sterilized milk, or "infant foods". It commences between 7 and 14 months, and in children of the wealthy, when the artificial food is widest from the mother's milk.

The skin is muddy, the infant wastes, becomes irritable and cries when moved, especially when the legs are handled. Effusion under the femoral periosteum gives the thigh a cylindric shape. The legs flex, later becoming straight and everted. Other bones are affected but less prominently. The gums swell, petechiæ appear on the skin, especially about the eyes, and puffiness on an eyebrow with slight staining of the upper lid has been described, the other eye being similarly affected later. Mucous hemorrhages also appear.

**Diagnosis:**—From ordinary rickets this malady differs in the prominence of the thigh affection, excessive tenderness, general swelling of the legs, tense shiny skin seldom pitting, without local heat, and liability to fracture near the epiphyses; the gums affected only about erupted teeth.

The prognosis is good.

The treatment is by the establishment of proper diet, including well selected milk and the fruit juices; fresh air, sun baths, hot salt baths followed by rubs with hot cod-liver oil, aids to digestion, especially an efficient diastase in generous quantities, and the use of splints to prevent deformity if required.

## PURPURA

Purpura may be secondary to scurvy, acute infections such as cerebrospinal meningitis, smallpox, measles, septicemia, ulcerative endocarditis, hemophilia, nephritis, leukemia, pernicious anemia, jaundice, Hodgkin's disease, tuberculosis, malignant sarcoma; locomotor ataxia, myelitis, hysteria; traumatism, straining, whooping-cough, convulsions; quinine, copaiba, belladonna, ergot, mercury, iodides; or serpent venoms. Primary cases are ranked as p. simplex, p. arthritica including peliosis rheumatica and Henoch's, and p. hemorrhagica.

**Purpura simplex:**—The cause is not known, but the disease is most frequent about puberty, following acute infections. Cutaneous hemor-



rhages appear as petechiæ, vibices or ecchymoses—the first minute dots of blood in the hair follicles, the second in streaks, the third larger extravasations in patches. They range from deep red to bluish, fading through brown and yellow. They appear in crops, and often on the legs. Bloody bullæ or blisters may appear. Gangrene has been known to follow.

***Peliosis Rheumatica***:—Schoenlein's Disease:—It may be rheumatic but cardiac disease is not often present. It is most frequent in men between 20 and 30. Prodromata are angina, slight joint pains, headache, anorexia. The temperature runs from 100 to 102; especially with inflammation of numerous joints. Purpura is sometimes attended by urticaria, exudative erythema and subcutaneous edema. The purpura occurs mostly over the affected joints and the legs. Intense itching attends the urticaria. Epistaxis is more frequent than other mucous hemorrhages. Edema may be very prominent. There may be albuminuria, or slight fever. Convalescence is long, relapses are common. The diagnosis embraces the three cardinal features, polyarthritides, purpura and edema. Purpura with urticaria is significant. The diagnosis is good but complications may be serious.

***Henoch's Purpura***:—This occurs in children, with inflamed joints, purpura and erythema multiforme, vomiting, diarrhea and abdominal pain, local cutaneous edema, mucous and sometimes renal hemorrhages. The diagnosis is difficult if the purpura is illy defined. Prognosis good if without complications.

A case was reported in which purpura could be developed like urticaria by drawing a pencil over the skin.

***Purpura Hemorrhagica—Werlhof's Disease***:—This is most common in young women, with malnutrition, especially if rheumatic or malarial. It is now regarded as infectious. There may be a few days of prodromes, headache, malaise, anorexia and depression; then a rather abrupt onset, fever, and ecchymoses in the skin, rapidly multiplying. Slight mucous hemorrhages also occur. Epistaxis is most common but bleeding may occur and recur from all the mucosa. Prostration is marked, with aching in the legs, loins, abdomen and in the chest preceding a hemorrhage. The temperature rarely rises above 103; the pulse is rapid, full and regular except in grave forms; the mind is clear, the face anxious. Hematuria and nephritis sometimes ensue. Anemia follows the hemorrhages. The lymphocytes and small mononuclears multiply. The attack lasts a week or more, severe cases going longer. A malignant form is quickly fatal.

***Diagnosis***:—Scurvy is distinguished by its history, the spongy gums, loosening teeth and brawny indurations. Purpuric petechiæ do not

occur in the hair follicles, and mucous bleeding is far more serious than in scurvy. Hemorrhagic eruptive fevers are to be separated by the history of exposure, and by the characteristic prodromes and invasion.

The prognosis of purpura is grave, from complications, repeated bleedings, or from the system being overwhelmed in malignant forms.

**Treatment:**—Secondary forms require the treatment of the primary malady. Anders advises arsenic pushed to toleration. Legroux lauds perchloride of iron, in doses of half to one dram daily, with oxygen inhalations to promote hematosis. In rheumatic forms the salicylates should be given. In all cases the patient should be confined to bed, with plentiful nourishment, easily digested or predigested, and fresh air ensured. The ordinary hemostatics are always tried, and in the writer's experience are worthless, iron notably injurious. Ergot does no good but if in large doses is harmful. Calcium chloride is probably effective. Locally a solution of cocaine, 2 per cent, has promptly and effectually restrained the bleeding. The bowels should be kept free by salines, and disinfected by calcium sulphocarbolate, about 40 grains *per diem*. Rhus aromatica has been found effective as a hemostatic. Turpentine has been recommended, and possibly the oils of erigeron and eucalyptus, which have proved effective in renal hematuria, may succeed here. Distinct benefit followed in one case when hamamelin was administered with free hand. But every physician will try the list of hemostatics in succession, until he finds for himself that they are worthless and that purpura is not simply a hemorrhage.

## HEMOPHILIA

The "bleeder's disease" is transmitted by the females of affected families, themselves unaffected, to their male descendants only. The muscular coat of the arteries is atrophied or absent, the vasomotor equilibrium is unstable, and hemorrhages occur spontaneously or on slight cause, exceedingly difficult to restrain. Rarely women suffer. The men of bleeder families are large and vigorous, with delicate complexions, and the malady manifests itself in the second year or not until puberty.

There may be a slight break of the skin or mucosa, tooth extracted, or a blow, bleeding sets in and goes far beyond the reasonable expectation. Or the hemorrhage may be spontaneous, epistaxis being very common. The hemorrhage may be from the skin, mucosa, or as ecchymoses. It may be free enough to soon destroy life but generally is in the form of venous oozing. Extravasations follow slight bruises or form where pressure has been exerted. Anemia ensues in proportion to the loss of blood.



The blood if examined in ordinary times or before hemorrhages does not show anything abnormal except perhaps an excess of leucocytes, not marked. Bleeding may occur into the large joints, such as the knee. Arthritic inflammations sometimes occur, especially in damp, "rheumatic" weather, and these may precede an outbreak of hemorrhage. The joints may be permanently injured.

The diagnosis can not be made from persistent oozing of blood unless the heredity is established. The presence of joint disorders, and repetitions of the bleeding from insufficient cause, aid the detection of this malady. Edema and urticaria distinguish peliosis rheumatica. If the disease develops early, many die in childhood. If it does not appear till puberty the danger is much less. First hemorrhages are rarely fatal. Menstruation is not dangerous, and while most physicians dread bleeders in confinement, Kolster's records of 130 cases did not show an extraordinary fatality from bleeding, there being only three deaths of mothers and 16 abortions.

When a man is known to be of a bleeder family all surgical operations should be tabooed, even the bite of a leech having proved the source of dangerous hemorrhage. The gums must not be lanced, or the child circumcised, and appendicitis must be permitted to recover without operation. Women of such families should be forbidden marriage and maternity.

The patient during an attack should be kept at rest and every effort made to control the bleeding by pressure. Mineral astringents are worthless, but good results have been obtained from the local application of turpentine. Cocaine solutions locally have quickly checked the bleeding, and suprarenal extracts succeed but require frequent repetition. Calcium chloride has accomplished probably more than any other remedy internally, and calcium is probably the active agent in gelatin. Hydrastinine is of unquestionable value though slow to act. Iron, ergot and all mineral astringents do harm. Tannic acid used to plug a tooth cavity succeeded in one case. Great care must be exercised during convalescence if iron is administered to restore the blood crisis, as it is apt to cause renewed hemorrhage. Calcium lactophosphate is advisable in doses of gr. 5 daily, divided, for several months.

## HEMORRHAGES OF NEWBORN INFANTS

**Epidemic Hemoglobinuria—Winckel's Disease:**—An infection occurring in hospitals in children under 10 days of age. The infant refuses to nurse, is jaundiced, and has gastroenteric catarrh. The urine is scanty, dark, contains albumin, casts and methemoglobin. Mucous and parenchy-



matous hemorrhages occur, with slight fever, convulsions and rapid emaciation. Death usually results. The disease may be produced by growth of the colon bacillus in the infant's mouth. In some cases only diplococci were found. The disease may be caused by any of several microorganisms.

**Buhl's Disease:**—This is another infectious malady of newborn infants, resembling the preceding but characterized by cyanosis, jaundice, copious visceral hemorrhages, and acute fatty degeneration of several organs.

**Syphilis:**—This is occasionally the cause of hemorrhages soon after birth, ecchymoses, mucous bleeding, and especially hemorrhage at the navel. It is probably a coincidence that in every case of navel bleeding in the writer's practice he has detected syphilis, and all have been fatal. Jaundice develops if the infant lives long enough.

**Morbus Maculosus Neonatorum:**—Gastrointestinal hemorrhage in the newborn may be due to trauma at birth, or be independent. Cerebral hemorrhages are frequent. Gaertner attributes the disease to a bacillus entering by the navel. Bleeding may occur from the navel, mouth, nose, etc. One half the patients die within a week.

The treatment of all these maladies is uncertain, and should be based on general principles. The reader is referred to the chapter on purpura.



## PART III

# DISEASES OF THE BLOOD AND DUCTLESS GLANDS

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### ANEMIA

By this term is designated a state characterized by diminution in the quantity of the blood, of its red corpuscles, or of their hemoglobin. There may be disease of the blood itself or of the blood-making organs. The red cells may be few and their content of hemoglobin high, or *vice versa*. While we infer the existence of anemia by the patient's pallor, languor, dyspnea on slight exertion, and palpitation, the blood count is essential to a positive diagnosis.

**Simple Anemia:**—This is not infrequent as a congenital malady, among the city poor, children of weakly degenerates, the victims of bad food, unhygienic dwellings and vicious habits. The blood-making function is defective. The symptoms are as above given, with headache and debility. If the occupation is not specially exacting or laborious pretty good general health may be enjoyed for years, until some unusual call is made on the hematopoietic apparatus which it is unable to meet. The blood examination shows some scarcity of red cells and deficiency in hemoglobin.

The diagnosis is only to be made after the fullest and most searching examination has failed to show any appreciable cause for the anemia, and even then we know it is secondary but our knowledge is insufficient to detect the underlying malady. It may be years before the development of the case has cleared up the mystery. The prognosis is good, as the failure to detect causal disease indicates the absence of the more serious maladies.

The treatment consists in arranging the regimen on the lines of hygiene, avoiding causes of waste, conserving the energies, regulating the bowels and the digestion, and administering numerous minute daily doses of any preparation of iron suited to the case, with nuclein to retain the metal in the system. Hot salt baths or rubs are useful, and judicious out-door exercise, stopping short of fatigue, with sea or mountain air. Residents



of altitudes of 9000 feet are all apparently hyperemic, from their high color.

**Chlorosis:**—This form occurs among girls shortly after the establishment of the menstrual function. The hemoglobin is deficient. Degenerative processes are found, with deficient development of the vascular apparatus, and sometimes of the genitals. Blonds are more affected than brunettes. Males are less frequently affected. The blood-making organs may have been barely sufficient to cope with their duties before the establishment of puberty, with no surplus capacity, and the enormous increase in the demands then made upon the blood are not compensated by development of this hematopoietic function. Soon the stress begins to tell. There is not blood to spare, and amenorrhea is manifested, and if emmenagogs are rashly given the condition is rendered worse. This affection is more apt to be developed in children of anemic, tuberculous or otherwise unhealthy parents. It is aggravated by bad hygienic regimen, sedentary sunless occupations, or by the unwise drains made by society exactions. Nervous shock or exhaustion aids in the causation, and absorption of fecal toxins has since Clark's time been recognized as a powerful contributory element.

The symptoms are the gradually supervening pallor, breathlessness on continually slighter exertion, palpitation, languor, debility mental and physical, irritability, depression, anorexia, indigestion, general lack of tone, vertigo and headache, constipation and flatulence. The fat is not affected. The name comes from the blue veins showing through the yellow skin, giving a greenish tinge to the complexion. The conjunctivæ are pearly white or bluish. The nails, lips and tongue show the lack of red blood. The skin and extremities are cold, the temperature subnormal. The pulse is full but compressible. The carotids and sometimes the jugulars pulsate. The heart dilates and soft murmurs may be heard over the base. The venous hum, *bruit de diable*, is heard over the cervical veins. Thrombosis may occur. Neuralgias, hysteria, depression, hyperesthesia of the skin of the abdomen, and gastralgia are not uncommon. The ankles are edematous by evening. The urine is pale, light and abundant. Urea excretion is lessened. The blood is pale through the loss of hemoglobin, which may fall to 16 per cent. Marked oligochromemia with little oligocythemia is significant. The red cells number from four to two millions per cubic mm., the whites about 8000. The red cells are pale, some macrocytes, many microcytes, poikilocytes in severe forms. The eosinophiles are decreased.

**Diagnosis:**—The greenish face in a girl past 15, with symptoms noted, confirmed by blood examination, makes it easy. Tuberculosis, nephritis

and the cachexias are to be excluded. The prognosis is good unless there is serious congenital maldevelopment of the circulatory apparatus. The duration under treatment is about two months.

**Treatment:**—Prescribe the hygienic regimen with emphasis. Cut off society observances radically. Insure proper food, in proper quantities, at proper times, to be eaten properly. Require plenty of sleep, just enough exercise, living in the open air, hot salt and later cold baths with rubbing until reaction is assured, and resort to the high mountains. A week in bed is a good preliminary in severe cases with much vertigo. The diet should consist largely of milk, eggs, fish, oysters, and fresh fruit juices. All stimulants are injurious. Full doses of papayotin, or of pepsin with hydrochloric acid, should be given with the meals to start digestion.

The remedy is iron. As Niemeyer said, there is scarcely an instance in the practice of medicine of equally beneficial results from drugs. The form of iron is immaterial so that all be given the patient can take and assimilate. More will be utilized if the doses are multiplied rather than a few large ones given. Some do well on Blaud's mass, others on the soluble citrates or the pyrophosphate. Occasionally we go back to the subcarbonate or to Vallet's mass, or to the tincture of the chloride, iron by hydrogen, or the malate. But the metal should be given with free hand, a dram a day of the mild salts being none too much. Give nuclein solution, 30 minims a day, to insure assimilation. Give a saline laxative every morning and an occasional colonic flushing, to prevent the iron collecting in the bowel as obstructing masses of sulphide. Intestinal antiseptics are useful after the preliminary flushing of the bowels, if the stools are fetid. The other tonics, arsenic, manganese, quinine, strychnine, quassin, berberine, zinc phosphide, should not be given unless clearly indicated. The practice of commingling all the tonics of the materia medica and firing them into the unfortunate patient at one broadside is unworthy modern medicine. The chalybeate waters are useful adjuvants.

## PERNICIOUS ANEMIA

By this term we designate a form of primary anemia which tends to increase despite treatment and ends in death. The fat is unaffected, the skin pale, tissues and organs anemic except the muscles, and fatty degeneration is general. The heart is large, flabby, pale, easily torn and fatty. The epithelium is fatty in the liver, kidneys, stomach, intestines, and arterioles. Extravasations of blood are common, and may be seen on the retina and serosa, less frequently under the mucous surfaces and in

the skin. The spleen and liver do not enlarge much but the lymph glands are swollen and quite red, their sinuses dilated, with numerous phagocytes containing red cells and pigment. Pigment is deposited in the liver, spleen, pancreas, kidneys and other organs. In the liver this is distributed about the periphery and middle zone of the lobules. It responds to tests for iron. The bone marrow is hypertrophied and deep red, with cellular hyperplasia. Sometimes the gastroduodenal mucosa is atrophied. The sympathetic ganglia are affected, the posterior columns of the cord frequently sclerosed, sometimes the lateral columns, especially in the cervical region. The vessels show hyaline degeneration, sometimes hemorrhages.

**Etiology:**—In some cases no adequate cause can be detected—there is active hemolysis, defective hemogenesis, or both. Stengel attributes this to fecal autotoxemia, Williams to streptococcal infection from carious teeth. Both are possibly right as to some cases. In other cases no sufficient cause has been found during life but the autopsy discloses unsuspected cancer, or parasites such as the *anchylostoma duodenalis* or *bothriocephalus latus*. Gastric atrophy is probably an effect of the malady rather than a cause. Agencies recognizable during life are exhausting diarrheas and other discharges, hemorrhages, infections, shocks, pregnancy and parturition with lactation, and the influence of certain cachectic toxins whose presence is unsuspected, such as lead, arsenic, malaria and the agencies operating through ochlesis and the absence of sunlight and fresh air. Pernicious anemias are more frequent among middle-aged men, and sometimes occur with remarkable frequency in certain localities. This, however, should always be traceable to local conditions, intestinal parasites or mineral poison.

**Symptoms:**—The development is imperceptible save in puerperal women. Pallor develops, with shortness of breath after slight exertion, palpitation, fatigue easily induced, languor, headaches, tinnitus, vertigo, anorexia and evidences of a progressively weakening digestion. Nausea, vomiting and fainting fits follow, while the skin assumes a semi-transparent waxy appearance. Prostration increases, the ankles become edematous, ecchymoses appear under the epidermis and in the visible mucosa, mental exertion is also wearying, and an apathetic state supervenes. Low delirium appears in the last stages. Fat may be increased. The pulse is rapid, full but compressible; soft blood murmurs are heard at the base of the heart and the *bruit de diable* over the cervical veins, which may pulsate visibly. If atrophy of the digestive mucosa occurs we have gastrointestinal symptoms prominently. Anemic amaurosis is disclosed by ophthalmoscopy. The sclerotics become pearly bluish, the



liver and spleen too soft to palpate, the bones tender. Respiration quickens, dyspnea increases to air-hunger, increased also by serous effusions and pulmonary edema. The urine is dark from urobilin, of low specific gravity, contains no albumin or glucose, but indican and an increased quantity of urea and sometimes of uric acid. There is often some fever but toward the last the low metabolism causes a subnormal temperature. When the cord is affected there is paralysis of the sphincters and limbs, with spasm, and various paresthetic phenomena. The blood may be pale or dark and watery, the red cells less than 1,000,000; their hemoglobin increased though its total is low. Macrocytes, microcytes, poikilocytes and polychromatophilia are constantly present. Nucleated red cells are characteristic of this malady, as normoblasts and megaloblasts. Gigantoblasts are numerous. The small lymphocytes are increased as the polynuclear cells become fewer. Marked leucopenia is always present (Cabot). Myelocytes are generally present in low percentage. The blood plates are few. The proportion of proteids to plasma is altered. Ring bodies are often found in the red cells.

**Diagnosis:**—This is made by the blood examination, and the progressive character of the malady, with remissions. First exclude constipation and autotoxemia; then, examine the stools for the eggs of parasites. Gastric atrophy and other maladies may be excluded by expert examination by modern methods. Cancer offers difficulty, especially if buried in the liver too deeply for manual detection.

*Pernicious Anemia.*

*Gastric or Hepatic Cancer.*

Blood changes	Those of secondary anemia
Red cells fewer than 1,000,000	More than million
Leucopenia, relative lymphocytosis	Leucocytosis
Earlier in life	After middle age
Few gastric symptoms	Prominent gastric symptoms
Skin lemon yellow	Pale muddy, or saffron
Fat sustained	Steady emaciation
Glands not enlarged	Clavicular or inguinals hard
Stomach signs absent	Gastric tumor
Test meal negative	HCl absent, lactic acid present
Remissions, rarely cure	Progress relentless
Fever not essential, subnormal late	Always some fever
Dyspnea on raising head	Abdominal decubitus
Skin smooth, or puffy	Skin hangs in folds
Facies apathetic	Facies of suffering
Ankle edema	Ascites
Tender bones	Abdominal pain

The blood examination distinguishes from chlorosis, besides the progress, hemorrhages, and the difference in age and sex.

The prognosis is necessarily bad if the diagnosis is to be sustained. Remissions and even intermissions occur. Death ensues in two to twelve months. The nucleated red cells become much more numerous shortly before death (Billings). Death is due to syncope, cerebral hemorrhage or exhaustion.

**Treatment:**—Put the patient in bed, enjoining absolute rest, with sufficient massage to maintain nutrition but not enough to exhaust the very low vitality. Empty the bowels with mild salines and colonic flushes—*but empty them*. Nothing must be permitted to interfere with the flow of nutritive elements from the bowel into the blood, and an empty and comparatively aseptic bowel is the first requisite. The diet should then be arranged so that a small supply of food, easily digestible or predigested, is supplied every four hours. Milk, eggs, fish, oysters, soured meats like pigs feet, raw scraped beef, rice, barley water, the breakfast foods, fresh fruit juices, turtle and terrapin, and any foods for which the patient displays a craving, form the preferable list. The free use of appropriate artificial digestives is important—food not fully digested does harm. Hot salt baths and rubbing with salted towels are of value in bringing the blood to the skin where it meets the oxygen. The blood foods such as bovine and sanguiferrin are of great importance in a malady where assimilation is so weak that no unnecessary burden should be laid on it. Raw red bone marrow may be eaten on toast with relish, and while the testimony concerning it is doubtful there are no chances to be lost in treating this disease, and we can not afford to wait for certainty—moreover it does no harm.

Arsenic is praised by Anders, who does not consider the malady curable. As there is a marked tendency to fatty degeneration present, arsenic must act homeopathically, since it especially causes this process. But as arsenic causes in health an affection similar to that displayed by this disease, the drug must affect in some manner the unknown sources of the malady, and possibly there may be a substitutive action such as we see when arsenic has substituted its action for a spontaneous scaly affection of the skin. On the same principle phosphorus, which also causes fatty degeneration, should be tried faithfully, pushed to toxic effect, in pernicious anemias. This is best given as zinc phosphide, gr. 1-6 an hour before meals, four times a day, for a week; neuro-lecithin being given for the balance of each month. Arsenic is best given in the form of copper arsenite if there is any gastric or duodenal disturbance; as arsenic iodide if any indication for iodine exists or the fat formation is excessive; arsenic



bromide if insomnia is prominent and distressing; iron arsenate if well borne; strychnine arsenate if the heart and lungs need the stimulus of that powerful vital incitor—in a word, the forms of arsenic should be suited to the individual needs and faith not pinned on a single form to be given for all. But whatever form is given it should be in small doses every waking hour, and pushed till the beginning of toxic effect is manifested in irritation of the eyelids, then slightly diminished until this ceases, and kept up steadily. In all cases, the use of nuclein solution will impart an efficacy to the arsenic and iron they will not display without this addition. Give up to a dram a day of the standard solution—more if the repeated blood examinations show that the leucocytes are not unduly increased or diminished.

Saline lavage or hypodermoclysis is useful when the blood becomes too scanty to fill the vessels. Intestinal antiseptics are advised by Anders, and of these the sulphocarbolates are best, as most surely not destructive to the blood-cells as are those he mentions if given freely.

Nuclein and strychnine arsenate may be given hypodermically in some cases with great advantage. Syncope may be promptly checked or relieved by glonoin, with strychnine by hypodermic. Nutrition may be enhanced by moderately inciting cardiac action, by the milder cardiants such as cactin. Streptococcus infection is another reason for full nuclein medication, the serums being as yet too problematic for dependence.

Remissions and especially intermissions should encourage us to renewed efforts, and be looked upon as verifying our methods. If the malady recedes, why may we not make it keep receding?

## SECONDARY OR SYMPTOMATIC ANEMIA

Anemia occurs as a symptom or result of so many maladies that it requires special discussion, since it is frequently the main object for therapeutics, apart from the causal affection. A vicious circle is often established, the primary malady inducing anemia, and the latter, by supplying the morbid tissues an insufficient nutritive material, interfering with the recuperative processes.

The blood examination discloses moderate oligocythemia, the red cells numbering about 3,000,000, except in the acute forms following profuse hemorrhages. Hemoglobin falls relatively and even more than the cells. The adhesion of cells into rouleaux is lessened, and the color shows that hemoglobin is distributed to them unequally. They are unequal in size also and in staining capacity. Large nucleated red cells—megalo-



blasts—appear, with nucleated red cells of ordinary size; and the leucocytes multiply absolutely and relatively to the number of red cells.

**Etiology:**—Large hemorrhages cause acute, repeated small ones chronic, anemia. Women bear such losses better than men, infants endure them badly. Acute anemia is denoted by sudden blanching of the skin, with fainting, dim sight, cold surface and extremities, roaring in the ear, sighing, and quick, failing pulse, ending in unconsciousness and possibly death. Convulsions may occur. If recovery follows it is an unfailling surprise to note how quickly the lost blood is reproduced, even in comparatively weakly people. The water is first restored, then the white cells, then the red and finally the hemoglobin.

Anemia from inanition comes from food insufficient in quantity, defective in quality, or from insufficient digestive or assimilative capacity. The plasma decreases rather than the cells.

The losses of albumin in nephritis, of milk in lactation, pus in suppuration, and in diarrheas and dysenteries, produce marked anemias. Toxic forms come from lead, arsenic, mercury, phosphorus and iron. The cells are mainly affected. Typhoid and other infective fevers destroy many cells, and the parasites of malaria specifically attack the red corpuscles. Tuberculosis and syphilis also destroy many red cells. Fever itself is destructive of the red and uses up many white cells if it continues. The actual loss is diminished by the activity of the blood-making functions.

The symptoms have been fully described; they differ only in intensity and permanence from those of simple anemias.

The diagnosis lies in the recognition of the true cause underlying the anemia. But practically, when the primary affection is not evident, we look for tuberculosis, carcinoma, nephritis, autotoxemia, intestinal parasites, mineral or cachectic toxemias, wasting discharges or digestive difficulties. If none of these can be detected we seek to diagnose between pernicious and simple anemias.

<i>Symptomatic Anemia</i>	<i>Pernicious Anemia</i>
Detectable cause somewhere	Primary disease
Any age	Adolescence, early middle life
Causal history	History negative
Blood changes less marked; steadily progressive in cancer	Profound distinctive changes
Moderate and relative reduction	Marked disproportionate reduction
Gravity of primary disease	Gravity of blood changes
Symptoms subordinate to primary	Symptoms of anemia most prominent
Responds to treatment	Resists treatment

The prognosis depends on the causal malady.

The treatment is first that of the cause. Stop the leak; reform the habits, then supply materials for repair. The treatment of the anemia itself when secondary or symptomatic is that of the essential, with a wider range of indications for the choice of the various forms of iron, arsenic, and other remedies. Many times the presence of encumbering debris will indicate the occasion for iron iodide, the occurrence of headache when a habitual anemia is remedied will demand the bromide of iron, or of arsenic; the relaxation of digestive organs call for berberine; the weak heart, swampy capillary circulation and dropsy require apocynin. There is room for the nicest discrimination in the selection of the agents indicated and those that will be acceptable to the taste and the assimilation of each patient. But in all cases the bowels must be kept clear of residual feces, disinfected, and the diet nicely proportioned to the needs and the digestive capacity. The more thorough our knowledge of the patient's physiology—and psychology often—and the wider the range of our therapeutic resources, the greater will be our satisfaction in the practice of our divine art.

## LEUKEMIA

We have in this malady a usually chronic increase in the number of the leucocytes with changes in the spleen, lymphatic glands and the marrow. Anemia and emaciation coexist, with serous effusions, clots in the heart and large veins found post mortem, ecchymoses beneath the pericardium and endocardium, and fatty degeneration of the heart muscles. Leucin, tyrosin, acetic, formic and lactic acids, with albuminous degenerative products, have been detected in the blood, together with Charcot's crystals. The alkalinity is decreased.

The spleen is generally enlarged, sometimes enormously, the capsule thickened, adherent in patches where inflamed, its consistence dense except early in the case when it may be soft and pulpy. Cut surfaces are brown or mottled. The vessels at the hilum are enlarged. The tissue is hyperplastic, the cells are granular and fatty, connective elements increased.

Usually the marrow is affected, rich in lymphoid and blood cells, reddish brown and greenish yellow, puslike patches existing in apposition. Infarctions may be found. Several forms of leucocytes are present, and cells showing karyokinesis.

In the lymphatic glands we find early and marked hyperplasia, the cervical, inguinal, axillary and mesenteric glands being involved. The gastrointestinal glands suffer less frequently. The cell-elements are

increased, and a similar hyperplasia exists in the tonsils, lymph follicles, tongue, mouth, pharynx, thymus and the intestinal glands. The liver may be greatly enlarged, infiltrated, engorged with leucocytes and lymphoid cells undergoing nuclear division; the affection being disseminated or confined to areas. Similar changes occur in the kidneys, and nodules of leukemic tissue may be found in the brain, retina, serosa, lungs, testicles and skin.

**Etiology:**—The exciting cause is unknown. The phenomena point to an as yet undiscovered microorganism as the probable cause. Vel-semeyer analyzed 600 cases and concluded the cause was autointoxication from toxic albuminoids, from the alimentary canal. Something evidently increases the elaboration of leucocytes. Kottnitz attributes it to peptone autointoxication. Injury to the spleen has been assigned as an excitant, and ulcers of the intestines have frequently preceded the attack. Stomatitis may be a means for the entrance of causal microbes. Malaria has preceded many cases. Heredity is admitted, bad hygienic conditions have an influence, and it develops often during pregnancy or at the climacteric. It is however most frequent in middle-aged men, but occurs from infancy to old age.

**Symptoms:**—The acute form appears in youths, previously healthy. The onset is sudden, with prostration, fever and mucous hemorrhages. The spleen rapidly enlarges, at times the lymphatic glands swell, and severe dyspnea, palpitation and gastrointestinal troubles follow. Anemia supervenes and perhaps edema at the ankles. The leucocytes increase to 1-30 of the red cells instead of 1-300 to 1-600. As the lymphatic form prevails the lymphocytes multiply. Large mononuclear leucocytes and myelocytes are numerous, eosinophiles fewer than in chronic forms. The case grows worse, hemorrhages occur from the stomach or in the retina, brain or skin, and the resemblance to acute infections is close. Hemorrhages are less common in the young.

In chronic forms the onset is slow and insidious, resembling an ordinary anemia; or the first symptom noticed is an enlarged spleen. Hemorrhages, nausea, vomiting and diarrhea may occur early; or the growing pallor may excite apprehension. Priapism has been noted. The anemia increases, the ankles become edematous, the pulse quickens and softens, fever appears, dyspnea of anemia is increased by serous thoracic effusions, and by the enlarging liver and spleen. Epistaxis recurs more frequently, retinal hemorrhages may be detected and leucocytic collections. Mucous hemorrhages follow, hemic murmurs may be heard, and local gangrenes occur. Intestinal ulcers with dysentery, ascites, jaundice and peritonitis, attest the severity of the abdominal malady. Headaches, vertigo and



syncope attend the cerebral anemia, and death may ensue from apoplectic coma with hemiplegia. Deafness may follow small cerebral hemorrhages. Priapism may be annoying. Small central hemorrhages may cause local paralysis, ecchymoses appear, pruritus adds to the discomfort, and the discharge of uric acid increases.

Splenic enlargement is gradual, painless, not tender, the surface is smooth and substance firm. It may be very large. It increases after severe hemorrhage or diarrhea. It may cause dyspepsia, constipation, jaundice, a splenic souffle; ascites and enlargement of the liver are features. The spleen, lymphatic glands and marrow are variously involved, giving rise to terms characteristic—spleno-lymphatic, etc. The accessible glands may be seen and palpated, soft, resilient, movable. Tenderness over the sternum and long bones, slight swelling or deformity, may indicate disease of the marrow. The blood is pale, brownish or chocolate colored sometimes, the leucocytes increased even to 500,000 per cubic millimeter, and may exceed the number of red cells. In the splenomyelogenous form the characteristic is the abnormal presence of myelocytes, large mononuclear leucocytes with fine neutrophilic granular protoplasm, which make up one-fourth of the white cells. The polymorphonuclear leucocytes are normal or lessened in number, while those showing coarse basophilic granules may be as plentiful as the eosinophiles. The lymphocytes are relatively less, the bright acid-stained eosinophiles absolutely but not always relatively increased. The oligocythemia is not great, the red cells numbering about 2,000,000. Hemoglobin may be reduced relatively or a little more. Many normoblasts may be found, and cells with large pale nuclei, and others with nuclei fragmented, or giantoblasts. Osler found true leukemia developing from pernicious anemia.

Lymphatic forms are rarer and more rapidly fatal. Lymphocytes are increased, all other leucocytes relatively diminished, the former forming over 90 per cent of all, chiefly small forms. Some nucleated red cells are present, some myelocytes, and erythrocytes showing changes in form, size and color on staining. Eosinophiles are fewer relatively. Blood plates may be abundant. Charcot's crystals appear in the blood on standing. Mixed forms of leukemia are common.

Among complications, are fatal hemorrhages occurring at any time, pleurisy, pneumonia, septicemia, renal disease and intestinal attacks. Acute tuberculosis reduces the leucocytosis but chronic forms do not influence the course of leukemia.

The diagnosis is made by the examination of the blood, and by that alone. Leucocytosis shows a much more moderate increase, mainly of polynuclear neutrophiles, with no myelocytes. Pseudoleukemia shows

large bunches of lymphatic glands, and simple leucocytosis. Malignant and malarial enlargements are excluded by the blood examination.

**Prognosis:**—Lymphatic forms progress more rapidly; so do children's cases. Most cases are fatal within five years, many in half that time. Acute forms kill in two weeks to two months. Advanced cases are hopeless. Ominous are profound debility and anemia, severe and obstinate hemorrhages, apoplexy, persistent diarrhea and high fever. Intercurrent infections often kill and sometimes exert a beneficial influence.

**Treatment:**—Nicholas Senn suggested the first distinctly beneficial measure—the application of the x-ray over the sternum, spleen and extremities of long bones, for 10 minutes over the viscera, 5 minutes over the joints. This is followed by subsidence of the fever, contraction of the spleen, increase in red cells and hemoglobin, and a primary diminution of the leucocytes, which later reincrease although the patient improves in weight and strength. This is most promising and subsequent experience may indicate the means of extending and improving these first results.

The hygienic regimen advised under the head of anemia should be here put in force in its entirety. A mild dry climate is advisable. Traumatisms, inflammations, excesses, unhygienic lapses, are to be strictly prevented. Anders advises arsenic pushed to full tolerance. Iron arsenate, quinine arsenate, copper arsenite, strychnine arsenate, arsenic iodide, arsenic bromide, each may be employed to meet its special indications, alone or in combination. Raw bone marrow may be useful. Saturation with arsenic sulphide would be an obvious expedient if this malady is really an infection, and if there is no contraindication should be tried. In all cases the bowels must be kept free from fecal collection and decomposition, and for this we rely on salines by stomach and colonic flushes, followed by calcium sulphocarbolate about two scruples *per diem*. Whether the enlarged spleen can be reduced by full doses of berberine, or by pushing polymnia uvedalia to toleration, may in the helplessness of ordinary therapy be justifiably ascertained by experiment.

## PSEUDO-LEUKEMIA

Hodgkin's disease presents the anatomic changes of lymphatic leukemia but the peculiar blood changes are absent. There are two varieties. In the most common the lymphatic glands are chiefly involved; in the other form the spleen is enlarged. Hyperplasia occurs in the lymphatic glands, which enlarge and are matted together in bunches. They may be hard or soft. The skin over the masses is usually movable. Sec-



tion through a gland shows a smooth white or reddish-gray surface, yellowish in the firmer glands. Suppuration may occur also. Caseous areas or hyaline masses may also be found. The lymph cells are hyperplastic; the older and harder specimens showing connective hyperplasia as well. The cervical glands are generally involved; the inguinal, bronchial and lumbar less frequently than the axillary, mediastinal, scapular and pectoral. The retroperitoneal glands are more frequently affected than the mesenteric. The abdominal vessels and nerves may be compressed. In four-fifths of the cases the spleen is slightly enlarged, containing disseminated nodules similar to the glands. Sometimes only the spleen is affected. Lymphadenomas also develop in the tonsils, tongue, bowels, liver, kidneys, lungs, brain, heart, testicles, retina and the skin. Erosion of the vertebræ has opened the spinal canal. The bone marrow is often affected also.

**Etiology:**—Men are mostly affected, between ten and forty years. The predisposing and exciting causes are obscure. It is believed that an as yet undiscovered infectious agent is the cause. Tubercle bacilli have been found in some of the glands, probably accidental infections. It may develop during apparent perfect health.

**Symptoms:**—Attention is first attracted to enlargement of a submaxillary or cervical gland; others become involved and the mass increases in size and density. It may be years before another group is affected. The general health is not affected at first, but symptoms of anemia gradually appear with progressive debility, emaciation and derangement of digestion. Dropsies follow and hemorrhages occur. A little fever may be detected and this may be intermittent, the paroxysms continuing some days or weeks. Such cases are acute. As the glands develop pressure symptoms arise, varying with the locality. The enlarged glands may number hundreds. They are not tender or painful unless nerves are compressed. Pressure on the respiratory apparatus may even prove fatal. The head and arms may be congested, circulation being maintained through the dilated superficial veins. Edema of one hand and arm may result. Pressure on the pneumogastric disturbs the heart, or it may be pushed out of place. Pressure on the femoral veins may cause dropsy of the legs. Albuminuria is common. Jaundice sometimes occurs from pressure. A host of symptoms due to pressure in many parts of the body might be described, while pressure on nerve trunks may give rise to neuralgia, followed by paralysis in the region of their distribution. Pleuritis occasionally occurs, or erythema and sometimes bronzing of the skin. In splenic cases the enlargement may be great without lymphatic involvement. The red cells are somewhat diminished, the white ones increased.



**Diagnosis:**—From tuberculous adenitis the distinction may be difficult, but the growth is slower in tuberculosis, extension rare; it is unilateral, occurs in the young and seems to prefer the submaxillary glands. Adhesion and suppuration are more common also. Intermittent fever indicates Hodgkin's disease. Microscopic examination of a gland clears up the diagnosis. Leukemia is excluded by blood examinations, syphilis by the history, the occurrence of other syphilitic indications and the results of specific treatment. The splenic form is diagnosed by the absence of lymphatic involvement. Blood examination distinguishes pernicious anemia with enlarged spleen, cirrhosis of the liver with splenic enlargement, malarial spleen and the enlargement which sometimes occurs without anemia.

**Prognosis:**—The disease is usually fatal, the course ranging from a few months to three years. Bad indications are rapid growth of the glands or increasing debility, anemia, emaciation, fever, pressure symptoms, hemorrhage or dropsy. The tumors sometimes subside shortly before death. General streptococcus infection, intercurrent diseases, empyema or nephritis may cause death.

**Treatment:**—Surgery has in this disease proved a total failure. The x-ray is being tried and some hopeful results have been recorded. The treatment recommended for leukemia is to be applied here. Phosphorus has been advised and may be given in the form of zinc phosphide, gr. 1-6 four times a day. Here again saturation with arsenic sulphide should be tried, and in splenic cases berberine with quinine arsenate given to full toleration.

## INFANTILE PSEUDO-LEUKEMIC ANEMIA

In this malady the most striking lesion is enlargement of the spleen. Its substance is hard and dark red, the tissue uniformly hyperplastic; the liver is also enlarged without hyperplasia; the lymphatic glands may be slightly enlarged and the marrow has been found to be reddened. The disease affects children under the age of four, being most common from six months to one year: Rickety children are most commonly affected, syphilis and digestive difficulties also predisposing.

The attack is insidious, the child growing pale, weak and thin and the spleen enlarging. The liver is often enlarged also, the edge being sharp. Digestive disturbances occur and the child may die from debility, peritonitis or pulmonary inflammation. The red cells are reduced below three millions and show abnormal forms. Hemoglobin is reduced still more, the leucocytes being increased sometimes to one hundred

thousand. The disease is distinguished from true leukemia by the frequency of recovery, by less hepatic enlargement and by the leucocytosis. The absence of hemorrhage and lymphadenoma with the history of rickets or other cachexia also distinguish it.

Most cases recover under a good hygienic regimen, attention to the bowels and suitable treatment directed to the anemia.

## SPLENIC ANEMIA

In this disease the spleen is enlarged, with anemia, but no lymphatic involvement. The connective tissue is hyperplastic, the gland cells atrophied, the malpighian bodies hyaline. This malady is found in rickety persons and others long resident in malarial districts. In the first stage extreme anemia is seen, with marked debility and wasting of the muscles but not of the fat; in the second stage the spleen enlarges with pain and tenderness, profound anemia, extreme debility and hematemesis. Other mucous hemorrhages occur and occasionally ecchymoses. Slight fever of hectic type is present. In the last period, cirrhosis of the liver, jaundice and ascites precede death. The blood shows red cells but slightly decreased with a great reduction in hemoglobin, poikilocytosis and leucopenia. The malady is fairly curable by the treatment advised in grave forms of anemia.

## CHLOROMA

By this title is designated sarcoma in and about the orbit. The color is pea-green. Secondary growths occur, also green in color. One case was fifteen years of age, another seven. The symptoms are orbital pain with protrusion of the ball and deafness followed by severe hemorrhages from the conjunctiva and the nose. Swellings appear in the temporal and carotid regions. The blood is pale and watery with multinuclear leucytosis. Death occurs in a few months.

## ADDISON'S DISEASE

The disease described by Addison was tuberculosis of the suprarenals. Some authors limit the affection to this, while others include all structural diseases of these bodies under this term. Tuberculosis in the suprarenal bodies is rarely primary but usually associated with the same malady in other parts of the body. The capsules are enlarged, with hard nodules formed by caseous masses in fibrous envelopes. In



advanced cases the capsules are contracted and adherent to surrounding structures. The microscopic examination shows a mass of detritus, with lymphoid and giant cells. Other diseases found in these glands are cirrhosis, carcinoma, sarcoma and chronic inflammation. Sometimes the solar plexus and semilunar ganglia are implicated in the disease extending from the suprarenals. In other cases there has been found enlargement of intestinal follicles and of the spleen, with softening, degeneration of heart, liver and kidneys, and persistence of the thymus. The bronzing is due to a deposit of pigment in the lower layers of the rete malpighii. In some cases no disease of the suprarenals could be detected, while in other cases unmistakable disease has been found in these bodies when no symptoms of Addison's disease had been presented during life.

**Etiology:**—The disease has sometimes followed injury. The connection with tuberculosis is frequently but not always traceable. Males are twice as often affected as females; all ages are liable but it is most common between fifteen and forty.

**Symptoms:**—The skin gradually darkens to a dusky yellow, yellowish brown, olive, deep greenish brown or black. It is most marked on the parts of the body exposed to the sun and where pigment is normally deposited, about the nipples, etc. Bluish spots are also found on the mucous membrane of the mouth, lips, conjunctiva and vagina. The skin also darkens where pressure is exerted by the clothing. White patches of leucoderma are sometimes present but the connection of these with Addison's disease is by no means certain. The writer has seen leucoderma many times but only once was Addison's disease diagnosed in connection with it, and as the lady is still alive after the lapse of twenty years and in the enjoyment of good health, the diagnosis was a mistake. Many small moles make their appearance, especially where pressure has been exerted by the clothing.

Before or with the bronzing occurs a gradually progressive anemia with debility, dyspnea, headache, dizziness, tinnitus, sighing, and bodily and mental fatigue induced by progressively slighter exertions. The blood examination shows moderate reduction of the red cells and hemoglobin, no leucocytosis but often leucopenia; emaciation is not common. The heart grows weak, the pulse small and feeble. Palpitation and fainting become common, the skin is cool, the extremities cold and soft anemic murmurs are heard over the heart. Loss of appetite is an early symptom, with general feeble digestion, gastric catarrh with nausea and vomiting following in time. Diarrhea occurs later. Neuralgic pain is felt in the epigastric, hypochondriac or lumbar regions. The mind is clear, in the later stages the patient becoming apathetic, which may end in coma or



low delirium. The discharge of urine may be very great. It contains little urea but indican, urobilin and uromelanin. The symptoms due to tuberculosis in some other parts of the body are added.

**Diagnosis:**—The peculiar bronzing is characteristic but it may occur in a number of other affections, including cancer and tubercle involving the peritoneum, diseases of the liver such as diabetic cirrhosis, protracted jaundice, chronic congestion and lithemia; pregnancy and uterine disease; the irritation caused by dirt, exposure and parasites; tinea versicolor, melanotic sarcoma; exophthalmic goiter; the stains remaining after syphilitic eruptions, and argyria, while some persons are brown naturally or from exposure. Nevertheless it is exceedingly rare to find in any of these affections the peculiar bronzing described by Addison, and especially in combination with progressive debility and abdominal pain, the spots on the buccal mucosa and the characteristic crops of moles. In the negro we must depend on the buccal spots and the general symptoms.

**Prognosis:**—Addison's disease is usually described as ending within eighteen months but the writer has had two cases presenting this malady in typical form with every symptom noted, one of which died at the end of ten years, while the other was still alive after that time had elapsed. Death is usually due to tuberculosis.

**Treatment:**—The treatment should begin with attention to the bowels, which should be kept free and disinfected. Apart from this the treatment is that of anemia already fully described. The administration of suprarenal extract may be resorted to with reasonable expectation of benefit. While this will not cure tuberculosis of the suprarenals, it must be recollected that it is by no means certain that all cases of Addison's disease are dependent upon tuberculosis. Even if the suprarenal disease be incurable, the function of these glands will be supplied by the extract, and great temporary relief will be afforded. The extract should be given hypodermically or to be absorbed from the mouth.

Raven obtained marked benefit from the use of adrenalin, m. 15 to 60 per diem, for 11 months.

## INFLAMMATION OF THE THYROID GLAND

The gland becomes the seat of boggy swelling, single or multiple abscesses, the vessels are engorged, and hemorrhages, thrombi and necrotic areas are found. The cause may be a blow, but the malady generally is an incident in the course of an infectious fever, such as smallpox, typhoid or malaria. It may occur with rheumatism or be caused by an unclean hypodermic needle.

The symptoms are fever, pain, swelling and tenderness, confined to one or more lobes. Suppuration follows. The swelling may obstruct the veins, causing vertigo, headache, cyanosis and epistaxis. Fatal compression of the trachea may occur. Suppuration generally ensues, and the pus may empty into the trachea or esophagus, or burrow widely.

The malady should be distinguished from inflammation of the laryngeal cartilages by the different location. The prognosis is good if the pus opens, or can be opened, externally. If the thyroid has been previously diseased the case is less favorable. The treatment is surgical. Pus should be opened as soon as it forms, while tracheotomy may be necessary.

## GOITER

In the simple form we have hyperplasia of all the tissues of the thyroid gland; in the follicular form the gland elements alone are increased. In fibrous goiter most of the increase occurs in the connective tissue stroma. This may follow thyroiditis. Cirrhotic contraction follows in due time. In the vascular form the blood-vessels are enormously dilated, generally the veins, sometimes the arteries. In cystic goiter one or more cysts develop, filled with fluid, which may be colloid, mucous or hemorrhagic. Amyloid degeneration affects the vessels principally. Colloid changes are frequent, while calcareous infiltration may be seen in very old fibrous goiters.

**Etiology:**—Goiter occurs in certain mountainous districts and also in others where the drinking water is highly charged with lime. Heredity is strong. It sometimes seems to be epidemic. Women are more liable to it than men. It most frequently begins between ten and twenty years, and many women date it from pregnancy.

**Symptoms:**—There are no symptoms until the thyroid has enlarged until it can be seen and felt. The development is usually slow but in time may become sufficient to embarrass respiration. One side is generally the larger. Sometimes it increases with each menstruation or pregnancy.

No pain is connected with the gland. The veins over it may be swollen and prominent. Less discomfort is experienced if the connective tissue of the neck relaxes so as to allow the goiter to hang low. When pressure causes discomfort it is usually in respiration. Rarely patients are affected with headache, somnolence, tetany and convulsions. The general health remains good, unless suppuration occurs or the gland is disabled by disease. Sudden death very rarely has occurred from hemorrhage or pressure on the pneumogastric.

A loud blowing murmur may be heard in the vascular form.



**Diagnosis:**—The location, shape and course are distinctive. Lymphatic, tubercular, cancerous or sebaceous growths, or Ludwig's angina, may easily be distinguished. Thyroid tumors rise during swallowing. The course is chronic, the disease rarely shortens life but is not readily cured.

**Treatment:**—Persons living in goitrous districts should not drink the lime water, or any local water that has not been boiled. Prolonged residence in such districts is inadvisable. Vascular goiters may be contracted by ergot in full doses. The remedy for goiter is iodine, which is best used by applying over the skin and driving it in by cataphoresis. Give calx iodata gr. 1-3 to 2-3 t. i. d., alternated fortnightly with arsenic iodide gr. 1-67, q. i. d. Electrolysis is also applied with good results. Old and degenerated cases may be benefited by injections of iodine, tapping cysts and ligating the thyroid arteries, or the diseased part of the gland may be extirpated. The administration of the thyroids of animals has proved beneficial and very rarely curative. Considerable reduction of size has followed the administration of phytolaccin, alternated weekly with arsenic iodide, both pushed to the limit of toleration.

## EXOPHTHALMIC GOITER

This malady is characterized by tachycardia, thyroid enlargement and exophthalmos, with tremors. A number of theories have been advanced as to the origin of this disease. Some attribute it to disease of the central nervous system, others to disease of the sympathetic nerves, while still others look to the thyroid body itself for the origin of the disease. Walker has recently advanced the idea that the malady is induced by a toxin, formed in and absorbed from the alimentary canal. Whatever may be the cause, the disease is manifested by excessive action of the thyroid body with consequent overstimulation of the heart and engorgement of the vessels of the orbit. The disease is therefore exactly the opposite of myxedema. The thymus gland is often found to be persistent.

**Etiology:**—It is four times more common in women; may be present at any age but is usually found in adults; it is hereditary and especially apt to occur in persons with sensitive nervous organizations. Exciting causes are emotional shock or stress, severe acute disease and prolonged mental or physical strain. It may follow simple goiter, nasal affections or pregnancy.

The disease may develop gradually or rapidly. In the acute form we have excessive heart-action, incessant vomiting and purging, and marked projection of the eyeballs, sometimes with cerebral symptoms.



Lloyd reported a case which proved fatal in three days. In chronic cases tachycardia is the first symptom and may long precede the other three characteristics. The pulse is always over one hundred and any unusual exertion or excitement makes it more rapid, violent and irregular. Palpitation and dyspnea are common.

Inspection shows the heart's impulse to be forcible; the carotids and abdominal aorta pulsate violently, and pulsation may be seen in the capillaries and veins of the hand. The area of cardiac dullness increases, blowing murmurs may be heard at the base, while the normal sounds are accentuated. The protrusion of the eyeballs varies from time to time but tends to become permanent. As the adipose tissue in the orbit increases the lids may not reach to the cornea. Graefe called attention to the immobility of the upper eyelid when the patient looks down. Moebius called attention to inability to converge the eyes on near objects; Stellwag, to retraction of the upper lid. Vision is unaffected; the patient winks less than usual; the retinal arteries pulsate; irritation and ulceration of the cornea may result from inability of the eyelids to cover it.

Enlargement of the thyroid body may accompany or follow exophthalmos. The enlargement is in the vessels, especially the arteries, and fluctuates with the cardiac pressure. Pulsation may be visible, a thrill may be felt and a double systolic murmur be heard. Muscular tremors occur early, involuntary and fine. Neurasthenia is progressive. The mental condition is unstable; some fever may occur, occasionally followed by profuse sweating. Pigmentation of the skin sometimes occurs, or scleroderma, urticaria, pleuritis or circumscribed edema. Cutaneous resistance to the electric current is lessened and the forehead wrinkles are smoothed out.

Progressive muscular weakness keeps pace fairly uniformly with the anemia. Emaciation is a later development. Disorder of the stomach and bowels, and hemorrhages, tend to occur as occasional crises, due to some slight exciting cause. Albuminuria, polyuria and glycosuria are not uncommon. The chest expansion lessens. The heart which is stimulated by the excessive thyroid secretion into hypertrophy runs through the usual course, reaches the limit of its possible development and spurious hypertrophy supervenes, with symptoms indicating a failing circulation; the forcible beat shortens, the pulse is not sustained, dropsy appears at the ankles and crawls up, dyspnea increases, and portal obstruction is manifested with the symptoms caused by passive congestion of its roots. The instability of the emotions and the nervous system becomes increasingly evident.

**Diagnosis:**—The four cardinal symptoms—tachycardia, fine muscular tremors, exophthalmos and thyroid enlargement, are unmistakable.

Even when one or more of these is wanting, as is sometimes the case even for a prolonged period at first, the others are too significant to be mistaken for any other known disease. An ordinary goiter, flabby and relaxed, could scarcely be mistaken for the erectile, pulsating uniform enlargement of this malady.

**Prognosis:**—If let alone the course is chronic, for several years. When the heart has begun to give way the problem is difficult. Periods of arrest occur, and these may be permanent.

**Treatment:**—These patients do better in moderately warm climates, being decidedly worse in winter. An elevation of between 3000 and 4000 feet has proved beneficial. Cold applied over the thyroid moderates its excess, and various hydropathic measures have been found useful in special cases. The same may be said of electricity; in general the sedative applications allay the excitement and delay the progress of the malady. Anders says that the application of an ice-bag over the heart has admirably reduced the heart-hurry in some cases, but Weber affirms that this is the most effective means known for increasing the force of the heart. Rest in bed is always beneficial. The diet should be light and unstimulating; alcohol, tea, coffee, chocolate, soups and hot drinks of all sorts forbidden. It must be useful in all stages to decrease the circulatory excitement and pressure by lessening the quantity of blood in the body, by the dry diet.

Anders says that recovery followed the use of digitalis, ergot, strychnine and iron arsenate, for six months, in two cases. These must have been advanced to the degenerative period, for while the heart is actively hypertrophic such remedies would be perilous. In other cases sodium salicylate, sodium glycerophosphate, quinine bromide and other agents have been found useful. Thyroid extracts do harm as might be expected. The serum from thyroidectomized goats has been recently supplied. In one very advanced case the writer has found some benefit from it; not much, but as this patient is in the later stages with dropsy, etc., anything that gives a little relief is welcome. In the early stages with active hypertrophy the indicated remedy is veratrine, or aconitine if the stomach is irritable. Either should be given to exact desirable effect. When the circulation begins to fail the less contractile cardiac tonics are often the most useful remedies, such as cactin and sparteine, or strophanthin, rather than digitalin.

Total extirpation of the gland is apt to induce myxedema. Bilateral resection of the sympathetic nerve has been done with much benefit. Starr collected 190 cases where operations had been done; of these 74 were pronounced cured, 45 improved, and 23 died promptly.



## MYXEDEMA

This malady follows such disease of the thyroid gland as destroys its functional activity. Three varieties occur.

In true myxedema of adults there is atrophy of the thyroid, and the symptoms may be attributed to the lack of the internal secretion supplied by this organ. The pituitary body is sometimes affected, and possibly this may explain cases of myxedema in which much of the thyroid is unaffected. The disease may follow exophthalmic goiter when the thyroid has been exhausted by overstimulation. In most cases the origin of the atrophy is unknown. There is some hereditary influence, and women are more frequently affected. The symptoms have disappeared during pregnancy and recurred after delivery.

The face is swollen, firm and brawny, the expression lines effaced, the skin rough and dry. The facies is dull and expressionless, stupid and imbecile. The hair falls, the teeth loosen, the tongue, lips and nose as well as the mucosa are infiltrated, and the voice becomes leathery, speech slow and measured. Curious nasal explosions occur during speech. All movements are slow and coördination requires effort. The infiltration is evident in the neck and above the clavicles. It is too firm for pitting on pressure. The process extends over the body generally. The cerebral functions are likewise performed slowly but correctly. Irritability may alternate with hebetude. Hallucination, illusions and delusions may be present, and the mental disorder may progress to melancholia or dementia. The symptoms are worse in cold weather. Sometimes there are disorders of the special senses, paresthesia, occipital headache, outbursts of temper, and stubbornness. The temperature is apt to be subnormal. The excretion of nitrogen is low as metabolism is reduced, and sugar or albumin may appear in the urine.

Sometimes there are hemorrhages from nose, gums or bowels. Ascites has been noted.

The thyroid may be absent. The diagnosis is easy, as edema shows pitting. An early sign is an appearance of solidity in the conjunctiva (Chapman). The course of the malady is slow, running for many years, and death usually occurs from intercurrent maladies. The prognosis is good.

**Treatment:**—Patients do better in warm seasons and climates. Warm baths are useful. Pilocarpine to full sweating has given temporary relief, and strychnine arsenate is a useful tonic. But the treatment of this disease consists in the administration of thyroid extracts by which the lack of the internal secretion is supplied, and the quick relief following



attests the correctness of this theory of the disease. As much of the raw gland or the extract should be taken as suffices to dissipate the symptoms. Begin with small doses and increase as tolerated. Vomiting, renal pain, tachycardia, suffusion of the face, syncope, vertigo or headache may follow overdoses. Anders says these may be obviated by combining arsenic with the thyroid extract. Good results may be looked for within a month. The remedy may be gradually decreased as the patient nears recovery, but some should probably be taken during the rest of the life, at intervals.

**Cretinism:**—This is congenital or develops in early infancy. The heredity may be from excessive nervousness, syphilis, goiter, or other causes of degeneration. It occurs endemically in certain Swiss valleys where there have long existed bad hygienic conditions, bad water, and constant intermarriages. Goiter here coexists. The cretins are dwarfs with large heads and faces, thick lips and tongues, broad bodies and limbs, prominent abdomens, myxedematous tissues, umbilical hernia, mental defect amounting to idiocy, and physical development retarded. The voice is harsh and unintelligible. Anemia with blood of fetal type is present.

Congenital cases usually die soon after birth. Others progress until the 15th year, then remain of the childish type during life. Thyroid preparations have proved serviceable, and neuro-lecithin would probably be a useful addition.

**Cachexia Strumipriva:**—The complete extirpation of the thyroid is followed by symptoms identical with those of myxedema or cretinism, supervening gradually, unless accessory thyroids happen to be present. The treatment is the administration of thyroids or of their extracts. By this the symptoms may be made to subside as long as the administration is continued, and even longer. Overdoses, however, tend to induce arteriosclerosis.



## PART IV

# DISEASES OF THE RESPIRATORY SYSTEM

### I. DISEASES OF THE NOSE

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#### ACUTE CORYZA

An acute inflammation of the mucous membrane of the nose, sometimes extending to the throat, larynx, bronchi, less frequently to the ears, or the sinuses opening into the nose.

**Etiology:**—There is a predisposition to colds in the head, especially in the subjects of chronic nasal catarrh, so that most attacks are simply acute exacerbations of the chronic affection. The nasal mucosa then appears to be the "*locus resistantiae minoris*," and it has been held to be a safe-guard, as colds settle here in preference to more dangerous localities.

The exciting causes are exposure to cold or wet, over-fatigue, excessive drinking, over-eating, the inhalation of irritant dust or gas, extension from pharyngeal or palatal catarrh. The epidemic form is probably due to the influenzal bacillus, or possibly at times to some other micro-organism. Attacks are often autotoxemic.

**Symptoms:**—The attacks often begin with itching in the soft palate, or burning in some part of the nasopharyngeal mucosa, chilliness, tickling, sneezing, and the discharge of a watery fluid that irritates the membrane and skin with which it comes in contact, excoriating the upper lip and margin of the anterior nares, and extending the inflammation. Headache, weakness, aching of the muscles and tendency to sweating from relaxation of the cutaneous tension, are commonly present. The temperature may rise to 100-104, the pulse accelerated but compressible, thirst is felt, the appetite may be good or impaired, the bowels constipated. The nasal passages are closed by swelling, but when the patient lies down the top nostril opens, the passage of air along it causing burning. When the patient turns over to the other side, in a few moments the under nostril closes and the upper one opens. Taste and smell are lost. Herpes around



the anterior nares or lips is common. The secretion becomes turbid, purulent, and large quantities of thick yellow muco-pus are discharged, sometimes tinged with blood. The acute symptoms subside within a week, the discharge gradually drying up.

Lachrymation and conjunctivitis indicate extension to the eyes, deafness and earache to the middle ear by the eustachian tube, cough and hoarseness to the larynx, etc. A rare extension is to the frontal sinuses. Twice we have witnessed this, in both instances delirium and coma supervening, which continued until calomel had been given to salivation. In a third case the symptoms were so alarming that we trephined the right frontal sinus, giving exit to offensive pus, with immediate relief. Sometimes this attack commences with itching in the soft palate; and if the spot is touched with tincture of iodine the attack is aborted.

**Diagnosis:**—Influenza is distinguished by the greater severity of the symptoms, especially the pain and debility, by its epidemic prevalence, and by the presence of the characteristic microörganisms.

Measles may be suspected if the patient is liable and has been exposed to this infection, by the accompanying catarrh of the eyes, pharynx, larynx and bronchi, and by the crimson, punctate eruption of the pharynx.

**Prognosis:**—Gravity lies in the possible extension of the affection to the lungs or the frontal sinuses; young, weakly infants and feeble old men being in the same danger.

**Treatment:**—Clear out the bowels with a brisk purge, adding an emetic if the attack is due to over-eating; give camphor, gr. 1; quinine sulphate, gr. 1; atropine, gr. 1-134; repeated every hour until the effect of the latter is manifested by some dryness of the mouth, and again whenever this has subsided. Forbid all food and drink, to keep the blood-vessels empty and allow the congested capillaries to unload. This may be aided in severe attacks by pilocarpine, gr. 1-67 every five minutes till sweating freely; or by amorphous aconitine gr. 1-134 every five to fifteen minutes, till the pulse is below 80 and congestion subsiding.

All methods that include the free use of beverages of any sort aggravate the malady. Dover's powder gives relief and may break up the attack, but it is less likely to do so than the combination recommended, and is apt to be followed by severe headache.

Locally the most satisfactory remedy is petrolatum. In many persons the application of this substance limits the spread of the inflammation. Melt cosmoline in a teaspoon, being careful not to get it too hot, and pour into the affected nostril; repeating as soon as the sneezing recommences.

If the attack has become established relief ensues when the nose is washed out with warm salt water, containing an ounce of distilled hama-

melis to the quart, through the nasal douche, and spraying with fluid albolene or vaseline. The inhalation of steam has a soothing effect.

The patient should be induced to remain in a warm room, the air kept moist by evaporation of water. As the attack subsides benzoic acid may be added to the petrolatum, gr.10-30 to the ounce. Plain fluid petrolatum, applied with an albolene atomizer to the nasal mucosa, is a powerful protective when the patient has to go out in the cold air.

Neither opiates nor cocaine should under any circumstances be employed.

### CHRONIC CORYZA

The nasal mucosa is infiltrated, the connective hyperplastic or cirrhotic, with constant secretion of muco-pus. The sinuses may be affected. The malady attends autotoxemia. It may be infectious.

Smell is weak or lost, the hypertrophy at first causes obstruction but atrophy relieves this. The decomposing crusts make the breath bad, and cause constant extensions of catarrh.

The secret of successful treatment is the cure of intestinal autotoxemia. With this apply euphen in fluid petrolatum daily, and a weak pro-targol solution once a week. Wash out the tract three times a day with warm soda solution, a dram to the pint of water. This simple method will cure curable cases.

### HAY FEVER

This is a form of acute nasal catarrh occurring in the fall or spring, each victim expecting the onset on a special date, or when some particular plant is discharging its pollen. The golden-rod is especially obnoxious. The affection is more common among men, young or middle-aged, usually of wealth and leisure. It is hereditary, more common in city dwellers, though worse in the country air. Autotoxemia causes or increases the susceptibility. Hypertrophies of the nasal mucosa are frequently present.

**Symptoms:**—The attacks begin abruptly, with symptoms of acute catarrh of the nose, eyes and pharynx. The discharge usually remains clear. The affection is aggravated by exposure to the open air. Sometimes the catarrh extends to the pulmonary tract. The symptoms persist until the flowering season of the obnoxious plant is over or until frost. Dyspnea may be asthmatic.

**Diagnosis:**—Hay-fever is distinguished by its recurrence with each season, the persistence of the first-stage symptoms, and its obstinacy in resisting treatment effective against ordinary catarrh.

**Prognosis:**—As regards a permanent cure the chances are not good.



**Treatment:**—Patients must get out of reach of the causative element, and immunity is found by some at the seaside, by others in elevated mountainous resorts, by others in northern latitudes. Petoskey, in northern Michigan, is a favorite resort for Chicago's hay-fever sufferers.

The chances for relief are better if hypertrophy or other removable disease of the nasal mucosa is found. In some instances the cure of such local disease has been followed by a cessation of the attacks, the pollen no longer finding a congenial habitat. The application of formalin or chromic acid, to harden the spongy tissues, has been tried with some success. Begin with a half per cent solution and increase until the desired effect is secured. The objection to all irritant applications is that they require preliminary cocaineization, with the great danger of the formation of a drug-habit, the most disastrous of all that afflict humanity. It is better to wash out the nostrils with mild alkaline solutions, such as a quart of warm water with a dram of soda or salt, and an ounce of hamamelis distillate, and then apply a protective spray of fluid petrolatum.

Some success has ensued from the administration of strychnine arsenate, gr. 1-30, every four hours, increased until the effect of the strychnine is manifested. This may require four times the above dose, or more. The astringent effect of suprarenal extract has been utilized with some success; gr. 5, three or four times a day. Atropine, gr. 1-500, every half-hour till the secretion is checked, is the best palliative, and has no danger back of it like cocaine. Possibly the attack could be prevented if the prospective patient wore a respirator charged with antiseptics or glycerin to prevent the access of the pollen.

Gleason follows cocaine with 4 per cent antipyrin solution to prolong the effect. Hollopeter daily sterilizes the nasal tract by Dobell's solution, atomized and then swabbed, plugging the nostrils with cotton saturated with menthol in albolene.

## EPISTAXIS

The causes of nose-bleed are traumatism, nasal maladies, typhoid fever or influenza, diphtheria or scarlatina, hemophilia or pernicious anemias, vicarious menstruation, rare air, plethora, over-exertion and early arteriosclerosis.

The blood is bright, arterial, and may flow out or be swallowed and vomited. Anemia results from fracture at the base of the brain, diphtheria and scarlatina. It is a bad omen.

**Treatment:**—In ordinary cases the bleeding ceases soon if the nostrils are washed out with cold water and compressed till clots form. In diphtheria, syringe with chromic acid solutions, increasing strength till effective.



Suprarenal solutions may be applied. In obstinate cases plug the nostrils, back and front. Cocaine solutions stop oozing. Any astringent relieves mild forms. Atropine might be given in bad cases. Clear out the bowels. In recurrent cases give calcium lactophosphate, 10 grains daily, for a month. We believe there is here a certain fragility of the cell-walls, and that this is removed by the persistent administration of this soluble and assimilable form of lime. This may be continued for a year or more.

## II. DISEASE OF THE LARYNX

### ACUTE LARYNGEAL CATARRH

**Etiology:**—The causes are those of acute catarrh, exposure to cold and wet, inhalation of irritants, and extension from the bronchi below, the pharynx and nose above. Measles, whooping-cough and other acute infections are attended by laryngitis. Smoking and alcohol-drinking occasion an increased liability to it.

**Symptoms:**—Cough, hoarseness, pain on endeavoring to talk, stiffness and sometimes pain in the larynx, and irritation as if a crumb had lodged in the larynx, are characteristic symptoms. The cough is dry, wheezing and incessant. Swallowing may be painful. Dyspnea follows if there is swelling of the glottis. There may be a little fever, the pulse slightly accelerated. The laryngoscope shows the mucous membranes red and swollen, dry or covered with a sticky mucus.

**Diagnosis:**—Dry cough, and interference with the function of the larynx, phonation, are characteristic. The laryngoscope reveals the location and extent of the affection.

**Treatment:**—Confine the patient to a well-warmed room, and let him inhale steam as frequently as possible. Speech must be forbidden. Apply a cold compress to the neck over the larynx. Subdue the fever with aconitine amorphous, gr. 1-134, every ten to thirty minutes for an adult, and stimulate secretion by apomorphine, gr 1-67 at the same intervals, suspending it on the occurrence of nausea. No other remedy equals steam for the cough, and it is unnecessary to add any medicament like benzoïn. If the irritative cough persists give syrup of yerba santa, a teaspoonful every hour or two. Great care should be exercised when the patient goes out into the cold air, and a respirator could be worn with advantage, especially if the patient does not breathe exclusively through the nose. A sweat from pilocarpine, gr. 1-6 at the beginning, with a brisk purge and abstinence from food and drink, will usually abort the attack.

## CHRONIC LARYNGITIS

The mucosa is thickened, ulcerated and the connective hyperplastic. This follows the acute form or occurs in public speakers and singers, alcoholics, those who inhale irritants.

\*The symptoms are hoarseness and cough, with discomfort or pain after speech. It is not readily cured.

The treatment requires rest, avoidance of irritants, clean bowels, sea air or pine forests, and the daily use of eucalypti in fluid petrolatum with an oil atomizer, alternated with other local applications of varied composition.

## LARYNGISMUS STRIDULUS

Spasmodic croup occurs most frequently in children under one year of age; rarely after the fifth year. Rickets frequently coexists. The attacks may be induced by temper, or by the causes of catarrh. The dyspnea is due to adductor spasm from reflex causes. Acute catarrhal laryngitis may coexist.

**Symptoms:**—A sudden attack of dyspnea occurs, at any hour, with crowing inspiration and cyanosis. There is no fever, cough or hoarseness. The paroxysm lasts but a few moments, and if severe may induce general convulsions. It may occur at any hour, several times in the same day. The attacks are commonly termed "kinks," and the child believed to hold the breath purposely when crossed.

Occurring in the course of laryngeal catarrh, the child's breathing becomes harsh, it coughs and awakes with dyspnea, the attacks continuing for an hour or more.

**Diagnosis:**—Membranous croup is continuous, not paroxysmal, and occurs in older children. The characteristic exudation is present in this and in diphtheria.

**Prognosis:**—The paroxysms are rarely dangerous, though trying to the mother.

**Treatment:**—A dash of cold water in the face is effective, or cold applied to the neck while the child is in a warm bath. Pass the finger into the fauces and raise the epiglottis. If the child can swallow, a small dose of glonoin, gr. 1-1500 repeated every five minutes, is successful. In prolonged spasms this may be administered hypodermically, or a whiff of amyl given. A hypodermic of apomorphine, gr. 1-134, is suitable for the catarrhal form, occurring in older children. The treatment advised for catarrhal laryngitis is indicated in such cases. A sound spanking is



effective when the "kink" is due to temper. Treat the general condition and build up the nutrition. Keep the bowels open. Remove sources of reflex irritation.

## EDEMA OF THE LARYNX

This may be due to inflammation from any cause, tubercle, syphilis, erysipelas, typhoid fever, diphtheria, or disease of neighboring parts; or to general or local dropsy.

The onset is sudden and severe with dyspnea, aphonia, stridulous respiration of rapidly increasing difficulty. The swelling is about the epiglottis, rarely below the vocal cords. The swelling may be visible with the tongue depressed. The malady is perilous unless prompt relief is afforded.

In inflammation apply ice to the neck and mouth; leech the neck; scarify the edematous parts with a bistoury, guarded with adhesive plaster except the point. Tracheotomy may be required.

## MEMBRANOUS CROUP

Morell Mackenzie demolished the old barriers between diphtheria and membranous croup. He showed that the differences between the two were simply due to the location, diphtheria occurring in the richly vascular structures of the pharynx, with abundant glandular connections, croup in the thinner membrane stretched over the laryngeal cage, with no lymphatics except Luschka's gland. Croup is not followed by paralysis, simply because the little patients do not survive to reach the paralytic stage. The two affections occur coincidentally, and run into each other, diphtheria extending down to the larynx, the croupous membrane up to the pharynx. This has now become the prevailing view, especially since the Boards of Health, wisely choosing the safer side, have universally required the reporting of all membranous croup as diphtheria, considering it better to permit no possible case of the infectious malady to go at large.

Nevertheless, it is now becoming evident that there are cases of membranous croup that are not laryngeal diphtheria, but rather the highest manifestation of the inflammatory process. In these the microorganism of diphtheria cannot be found, and their causation is that of catarrh rather than of diphtherial infection. There is no sharply marked line of difference between catarrhal and membranous croup, but cases occur so near the border that it is impossible to classify them. The older works give as



the diagnostic signs of the graver malady the presence of fever with retraction of the abdomen on inspiration, but such cases occur, even necessitating surgical intervention, without any sign of membranous formation.

Membranous croup affects children between the ages of two and seven, rarely outside of these limits. Exposure to cold winds and damp is the usual exciting cause. "Croupy" children are usually affected by catarrhal laryngitis. Those who are housed too closely, in superheated flats, strangers to cold baths, rarely allowed to breathe the open air and then overloaded with clothing, are the usual victims.

The affection begins usually at night, with a hoarse croupy cough, with dyspnea, the child struggling for breath. The difficulty is most marked with inspiration. Examination of the throat may show a few white flecks on the tonsils, which increase and coalesce into a thin, white pellicle. The hoarseness deepens into complete aphonia and the child is seen to cough, not heard. The temperature rises to 101 to 103 degrees, the pulse keeping pace. The child lies quiet, the breathing being sufficient until he attempts to move, when the suffocative paroxysm at once comes on; he struggles for breath, clutches his mother, and finally falls back exhausted, when a moment's respite ensues. These symptoms continue until morning, when some moderation usually occurs, but as night comes on the struggle is renewed. The obstacle to the ingress of air is so marked that the abdomen is retracted on inspiration, showing a boat-shaped depression. This marks the danger-point. As expiration is less obstructed more air escapes from the lung than enters, the air in the tract becomes rarefied, and the powerful efforts of the child to draw air through the narrowed chink of the glottis cause suction as of an air-pump to be exerted on the air-cells. The result is that blood-serum is drawn through the delicate walls, and begins to accumulate in the air-cells and bronchioles. Its presence is manifested by serous rales, at first fine but growing louder, with cyanosis keeping pace with the effusion. The struggles of the child become less strenuous, it grows quieter, but the quiet is that of approaching death from carbonic acid anesthesia. This is the usual cause of death, and if surgical intervention be delayed till now it will fail to save the patient's life. Even if death does not supervene in this stage there would ensue an acute bronchopneumonia, probably resulting fatally.

In the rare cases ending in recovery the symptoms are prolonged for several days, until the membrane is loosened and spit or vomited up. It may be reproduced, but this is rare. In one case of the writer's that recovered, a strong girl near the upper age limit, with a larger glottic aperture than usual, paralysis of phonation remained for weeks.

The diagnosis has been already discussed. Catarrhal croup occurs in "croupy" children, with little or no fever, no exudate on the tonsils, no Klebs-Loeffler bacilli, and yields to emetics and other remedies. In diphtheria we may find the characteristic microorganisms, the malady begins in the throat, extends by preference up to the nose, the glands are early involved, and only secondarily it attacks the larynx.

The prognosis is of the worst. The older writers refused to believe recovery from true croup possible.

And this serves to illustrate clearly the shocking barbarity of their treatment. If the child were bound to die, why torture it with emetics of copper, alum, antimony, turpeth, etc? Why not mercifully let it die in peace if die it must? One only fragment of the old treatment is worthy of retention—the use of morphine. It will be noticed that as long as the child lies quiet the respiration suffices for his needs, and the paroxysms of dyspnea occur when he attempts to rise. Give him enough morphine to keep him tranquil, but carefully avoid narcotism, which is certain death. This reduces the violence of the paroxysms and conserves his strength. Then, as death is due to the pulmonary edema produced by suction, just as soon as retraction of the abdomen begins to be manifest during inspiration, intubate. Parents will not object to this at this early stage, as they are apt to if tracheotomy is suggested. But this matter of the parent's consent has been grossly exaggerated. The physician who does not know the necessity for such operation, and knowing this cannot show the parents that necessity, ought in pursuance of his duty as a saver of life to turn the case over to some one of sufficient force of character to compel consent to the duty. Parents have no rights that involve the sacrifice of their child's life.

Within a few years a new remedy for membranous croup has been advocated, in a preparation known as calx iodata. It is not a chemical iodide of lime, but a loose combination of lime and iodine, the effects of which closely resemble those of free iodine. The dose for a child in the croup age is gr. 1-3, repeated every five, ten or fifteen minutes, in a teaspoonful of hot water, until the croupal symptoms subside. We have many letters from experienced physicians who report almost invariable success with this remedy. Its use has also confirmed the views of those who believe some cases of membranous croup are not diphtheritic, for when the malady has originated in the pharynx as true diphtheria and extended to the larynx calx iodata has not proved effective, while calx sulphurata has exerted the same powerful control as over other manifestations of diphtheria, when pushed to saturation. Be this as it may, the subsidence of the symptoms of croup in a few hours while calx iodata is being



administered, is something marvelous to one accustomed to the old method with its invariably fatal ending. Morphine till abdominal retraction during inspiration occurs, then intubation, and calx iodata from the first, given with a free hand, are the three remedies for membranous croup—and the only three whose effects entitle them to consideration.

### III. DISEASES OF THE BRONCHI

#### ACUTE BRONCHITIS

Acute catarrhal inflammation of the mucous membrane of the trachea and bronchi. The affected membrane is red and puffy, exuding a secretion at first watery, then cloudy, opaque and finally purulent, gradually drying into scabs or crusts. The mucous glands swell, the epithelium is cast off, the submucous layers swell, become succulent, and in them leucocytes are found in numbers proportional to the severity of the attack.

**Etiology:**—The causes are those of catarrhs; exposure to cold and wet, inhalation of irritant gases, ammonia or ether, vapor, dust, etc. Usually the inflammation begins in the nose or throat and extends to the larynx, trachea and bronchi. Preëxisting chronic catarrh of any part of this mucous tract renders the individual more liable to attacks. The aged and very young, the feeble, uricemics, cachectics, those who are too much housed up in superheated flats or unused to exposure, are apt to take cold. Changes in the weather cause more or less extensive prevalences, and these resemble epidemics if they are not so in reality. Many infectious maladies number bronchitis in their symptoms or sequels, and in nephritis and valvular heart-disease it is often present.

**Symptoms:**—The early symptoms are those of a cold, chilliness, aching muscles and head, a sense of tightness in the chest, itching in the larynx, dull pain under the sternum, fever usually slight but ranging up to 104 degrees, the breathing somewhat accelerated, especially in children. The cough is at first dry and irritative, perhaps severe enough to cause soreness at the insertions of the diaphragm, and becomes looser as the attack passes the climax and the sputa become purulent and copious. The symptoms closely follow those of coryza as regards the secretion. The laryngoscope shows the mucous membrane red and swollen, later covered with the exudate. Children rarely suffer an initial convulsion.

The hand placed upon the chest detects some fremitus. Auscultation discloses sibilant rales or wheezing in the early stages, gradually replaced by mucous and submucous rales, growing larger as the secretion becomes freer, with sonorous rhonchi when sticky masses adhere to the



sides of the larger bronchi. Rarely there are collections of secretion large enough to cause slight dullness. Coughing may alter the character of the rales.

**Prognosis:**—Bronchitis is dangerous in infants, aged men and very feeble, cachectic persons. Extension into the smallest bronchi, with dyspnea, sluggishness or cyanosis, are grave symptoms in such cases. Ordinarily the attack subsides in a week, the cough and expectoration continuing indefinitely. Cachectic patients suffer severely and then the malady tends to chronicity. The low grade of sensation in the mucous membrane of young infants and aged persons permits the accumulation of secretion to a dangerous extent.

**Diagnosis:**—The slight fever, absence of crepitus and dullness, distinguish bronchitis from pneumonia. The former is bilateral. Pleurisy has a history of acute pain on inspiration, is unilateral, has dullness on percussion, bulging intercostals and loss of respiratory movement. In bronchopneumonia the rales are finer, the dyspnea worse, respiration rapid, fever higher, and dullness may be found in spots. Whooping-cough may be inferred even before the characteristic whoop, from the cough recurring in paroxysms that grow more severe as the catarrhal stage nears its end, the cough awakening the child from sleep and continuing until vomiting occurs. Measles presents a red, punctate eruption on the fauces and the fever is much higher.

**Treatment:**—As with nasal catarrh, it is possible to break up an acute bronchitis if seen early. Confine the patient to a warm, equably heated room, the air moistened by water continually evaporating in it. Administer a cathartic, restrict the use of fluids as strictly as possible, and give one of the following:

1. Aconitine amorphous gr. 1-134, atropine gr. 1-500, morphine gr. 1-67; given together, and repeated every ten minutes until the physiologic effect of one or other of the constituents begins to be felt. Generally it is the atropine, which manifests its commencing toxic action by dryness of the mouth. As soon as this is felt the frequency of the doses must be diminished to one-half hour, one hour or two hours, the object being to keep up the effect but not to exceed it. This has proved most effective for anemic, slender persons, but should not be used for uricacidemic individuals.

2. Atropine sulphate gr. 1-500, quinine sulphate gr. 1-6, camphor gr. 1-6; taken together every ten minutes till the atropine effect is slightly felt, then less frequently so as to keep up this effect but not to exceed it; that is, slight dryness of the mouth. This is good treatment for plethoric,

over-fed uricacidemic patients, and those who have weak hearts or a tendency to constipation.

3. Pilocarpine gr. 1-67, every five minutes until sweating or salivation begins, then enough to sustain the action just at this point. This is especially useful in stout patients with strong hearts, those given to excessive water-drinking, free sweaters.

In all cases it is necessary to forbid fluids, as if the veins are gorged with fluid there is little use in trying to reduce the hyperemia of the affected tract. The diet should for the same reason be spare. Much benefit is experienced in all forms of respiratory catarrhs by keeping the air of the room moistened by evaporating water in it, and by prolonged inhalations of steam frequently repeated. The mucus is softened and brought up and the inflamed membrane soothed by this procedure.

On the day following, the attack will be broken up but the patient relaxed and in favorable condition to contract fresh cold. If it be necessary that he should go out this relaxation should first be removed by tonics, such as brucine gr. 1-67 every hour or two, till the toning influence is manifest; and this should be sustained for several days, with restriction of the quantity of food and drink, these being non-stimulating in quality.

If the patient is not seen until too late to abort the attack, hurry it through its stages as rapidly and comfortably as possible. The same hygienic and dietary rules are to be enjoined, the bowels kept somewhat loose by saline laxatives, the hyperemia moderated by the judicious administration of the "dosimetric triad," given every half-hour to one or two hours as required. Only in pronounced plethorics should the strychnine be replaced by veratrine in like doses. Indeed, the relaxation usually manifest in respiratory catarrhs renders the tonics advisable in most cases from the first.

To promote mucous secretion we have three excellent remedies, apomorphine, lobelin and emetine. The first is the most powerful and speedy, and suitable to severe forms, in the robust. The dose is gr. 1-67 every quarter-hour till faint nausea is experienced, then less frequently. Lobelin is a powerful stimulant to secretion, better suited to croupy and dyspneal forms. Emetine is applicable to children and weakly patients, where the more powerfully depressing remedies might be dangerous if given recklessly. The doses and administration of lobelin and of emetine are the same as of apomorphine. Either should be continued until the mucous secretion is loose, thin and yellow.

To moderate the cough and bring it into harmony with the excretory needs of the patient we have likewise three excellent remedies. Codeine moderates bronchial irritability more directly than any other drug, with



less interference with digestion. It may be given in doses of gr. 1-24 to 1-6, repeated as the case demands. The second is the inhalation of steam. The third is patience. To one who has never tried it, it is inconceivable how much benefit accrues in the irritative stages of respiratory catarrhs from persistently restraining the impulse to cough, until the secretion is so loose that slight effort will dislodge it. The cough is largely due to the inflammation, consequently is useless and does harm by straining the lungs.

Mild counter irritation to the chest is of value, and the practitioner may choose between ammonia liniment, mustard mitigated with flour or molasses, or the cold compress covered thickly with dry, warm flannel. Each has its advocates and each is of value. Cold applications have proved unserviceable with us in treating uricemic, plethoric persons, especially those who catch cold easily.

As the attack progresses through its stages it may run into bronchorrhea, with free serous secretion. It is probable that in these cases the pulmonary tract has been invaded by a swarm of microorganisms, and the thin, watery secretion is a culture-fluid of these. The remedies for this condition are the inhalation or atomization of tar-water, and cubebs, myrrh, copaiba, balsam of tolu or Peru, benzoic acid and its salts. Benzoic acid and cubebin, gr. 1-6 each, every ten to sixty minutes, are as useful as any, unless it is copaiba, which may be given in capsules, m. v. every two hours in obstinate cases. Strychnine, gr. 1-30 every two to four hours, is also advisable to increase the tonicity and resistance of the bronchial tissues. The diet should be the more nutritious as any form of chronic bronchitis threatens to become established. But in every case the sputa should be repeatedly examined to see if some microbic infection has not occurred.

If the catarrh tends to become dry, with scanty secretion, it may require stimulation with lobelin; or Murrell's advice may be followed, of applying wine of ipecacuanha locally with an atomizer. But if dyspnea attends, with irritative cough and difficult breathing, the sensory respiratory nerve may be sedated by atropine gr. 1-500 every five to sixty minutes till the effect is manifested. This will be hastened by combining glonoin in like doses; or aspidospermine may be employed, gr. 1-12 every five to thirty minutes, or iodoform, gr. 1-6 every ten minutes.

In elderly patients the sensibility of the respiratory mucosa is slight, the tissues relax, and the impulse to cough is not felt. Secretions collect in the bronchi until the patient becomes dull, cool, cyanotic, the rales may be heard before entering the room, and the patient is literally drowning in his own secretions. The remedy is an emetic of seidlitz powder, the



acid solution being first swallowed and then the other, which will empty the stomach more quickly than any other emetic and without nausea or depression. Follow this with sanguinarine nitrate, gr. 1-67 every half to two hours, which will stimulate sensation and make the patient cough harder.

Infants with bronchitis also have little sensibility in the mucous membrane, and care must be taken that the secretion is raised. Somnolence, blueness about the lips, pallor; shallow respiration with little or no cough, should excite uneasiness but are apt to be overlooked by an inexperienced mother. An emetic will rid the chest of mucus but further lowers the vitality. Sanguinarine in doses appropriate to the age is of value, also strychnine pushed to the physiologic limit. Place the babe in a hot bath and dash a little cold water on the chest to excite crying and full respiration. If emetics are given it should be only at night, that the respiratory tract may be freed from mucus before the parents settle for sleep. Opiates should rarely be administered to infants and never when subject to bronchitis. Uricemics, cachectics, and persons addicted to the immoderate use of beverages, are especially subject to bronchitis and other respiratory catarrhs. Ice-water fiends are especially liable, as their constant perspiration renders them susceptible to every draft. This should be taken into account in seeking to lessen the vulnerability to colds. Patients should be restricted to their rooms until well over the attack, and be well protected when they go out.

## CHRONIC BRONCHITIS

Under this term are grouped a number of affections differing as to their causes and as to their pathologic conditions. The mucous membrane may be denuded of its epithelium, thin, the longitudinal elastic fibers hypertrophied, the glands and muscular fibers atrophied, the bronchi dilated into bronchiectases; or the mucous structures may be infiltrated by spurious hypertrophy, the interglandular connective tissue hyperplastic and the surface granular. Follicular ulceration is not uncommon while the atrophied tissue may be in part replaced by emphysematous dilation of the air-cells.

**Etiology:**—Chronic bronchitis may follow repeated acute attacks; underlying it we may find a cachectic or diathetic state, rheumatism, scrofula, uricemia, alcoholism, syphilis or nephritis. It occurs in the mechanical congestion of the lungs from obstructive disease of the heart. Primarily it occurs from habitual exposure to cold or wet, or the inhalation of irritant vapors or dust. It is common in old age. It is worse in winter,

in wet seasons, when sudden changes occur in the weather, and during or after epidemics of influenza. It tends to subside in the summer, reappearing earlier each fall and lasting later each successive spring.

**Symptoms:**—A sense of weight may be felt in the chest. If the mucus is adhesive or abundant the cough may be so violent as to cause soreness from straining the insertions of the diaphragm. The accessory muscles of respiration, the sterno-cleido-mastoids, scaleni, etc., in time become hypertrophied by the violent coughing, and stand out plainly from the shrunken tissues around them. Cough is more violent if the secretion is in the larynx or the smaller bronchi. It is less marked in old age when the bronchial sensibility is low and secretions accumulate. When chilling or other causes induce an exacerbation of the malady the cough is worse.

The sputa may be thick, scanty adhesive mucus, free muco-pus, starchy or gelatinous, dried greenish scabs, decomposed fetid plugs, or the serous discharge of acute mycosis. There may be a little fever towards evening, but this symptom usually indicates an acute attack or extension of the inflammation into the lung-tissues. The health may remain good for years, digestion fair, sleep disturbed by cough. The tendency is for the malady to extend. Dyspnea may be marked, or wanting.

The thorax expands, the respiratory movement is limited in range. The percussion sound is clear while auscultation gives rales of every degree of fineness and coarseness depending on the mucus present. Often loud bubbling is heard over both lungs, the patient coughs up a mass of sputa, and then the sounds cease. The vesicular sound is apt to be weak, rough, expiration prolonged and wheezing. Dullness on percussion indicates edema, pleuritic effusion or invasion of the lung-substance.

In the aged the most common form is winter-cough, occurring earlier each autumn and staying later each spring. Emphysema, dyspnea worse on exertion, sometimes cardiac disease or weakness, may be present. The sensibility of the mucosa is dulled, and the sputa may be retained until decomposition occurs, with fetid sputa, toxic inflammation of the bronchi and lung-tissue underneath, fever, somnolence, sapremia, carbonic poisoning and sometimes unexpectedly sudden death.

In bronchorrhea there is a very profuse discharge, of serum if colliquative or mycotic, of mucopus in late stages of the malady. Greenish masses of more consistence are discharged from the dilated bronchi.

Fetid bronchitis may develop in any case if the secretions are not coughed out. Acute septic inflammation ending in ulceration of the surfaces bathed in the decomposing secretions follows, or pulmonary gangrene may ensue, or empyema from perforation or extension to the pleura. In simple fetid bronchitis the sputa on standing separates into three layers, frothy mucus,



a serous liquid and a thick sediment, containing yellowish masses termed "Dittrich's plugs." These contain numerous microorganisms, especially the *leptothrix pulmonalis*, with fat, margaric crystals and pus-cells. The general symptoms are grave—rigors, chills, septic fever, rapid weak pulse, heavy sweats and rapid prostration of the vital powers. If the irritating products reach healthy mucous surfaces great irritation and violent coughing ensue. The result depends entirely on the treatment.

In dry forms of catarrh the secretion is scanty and adhesive, the cough incessant and dyspnea often marked. Emphysema is a common concomitant. The rales are dry, sibilant, and sonorous. This is the most frequent in elderly subjects, the thin, dried-up species.

Elderly women are liable to chronic bronchitis, beginning early in life with slight symptoms, morning cough, little expectoration, no special physical signs, becoming worse with years. Uricemia or scrofula may underlie. Anders mentions a case where bronchitis and eczema alternated in an arthritic woman.

**Diagnosis:**—Phthisis is distinguished by the history, the loss of flesh and strength, fever, signs of disease localized (usually at the apex), and the presence of bacilli in the sputa.

In pure emphysema there is increased clearness on percussion, weak vesicular sounds, dyspnea increased on exertion, obstruction of the pulmonary circulation if extensive, dilation of the clavicular or intercostal spaces, and the history and cause of that malady.

In pulmonary abscess the sputa contain shreds of elastic fiber, crystals of hematoïdin and cholesterolin, blood-pigment masses, and the site of the abscess is denoted by dullness before evacuation, cavernous sounds afterwards. No elastic fibers are found in gangrene, the ferment present causing their solution, but the prostration is extreme. Bronchiectases are usually on one side only; the physical signs of a cavity are present, the history pointing to this rather than to tuberculosis, and the sputa examination confirming the diagnosis.

**Prognosis:**—The victim of chronic bronchitis rarely recovers unless he removes to a suitable climate in the tropics. The malady may not shorten life, unless emphysema or heart-disease supervenes, or a microbic invasion carries some disease into the lung-structures.

**Treatment:**—The patient should live in a land of perpetual summer. Some protection is secured by hardening the skin, by daily cold baths or salt rubs, wearing wool exclusively, night and day, summer and winter, outside and inside, head to feet; in fact the "Jaeger system" in its entirety. The avoidance of exposure to cold and wet should be inculcated as a duty. Epidemics of influenza must be escaped with the utmost speed. The



inhalation of irritants must be avoided; crowded halls, smoky saloons, overfilled cars on damp, humid days, being common causes of acute exacerbations. Patients with profuse purulent secretion should be sent to the pine woods, those with scanty tough sputa to the seaside, while anemic cases with serous bronchorrhea should ascend to mountain resorts. In all cases an equable temperature should be sought. The hot, dry plains of Arizona suit cases with free secretion, while the Florida coast offers a suitable site for dry catarrhs. Among the islands of our Philippine possessions and in Porto Rico ideal locations could be found for all classes of sufferers with chronic pulmonary complaints.

Coexistent disease of the heart, lungs or kidneys, should receive appropriate treatment.

Much may be done by judicious diet and constitutional treatment, especially in diathetic cases. In uricemia the enforcement of the vegetarian regime, with the alimentary canal kept free by saline laxatives, aseptic by sodium or calcium sulphocarbolate, gr. 5 three to seven times a day, the eliminatives active by colchicine, gr. 1-134 two to six times a day, with full exercise, will greatly enhance the effect of direct medication. In scrofula, tuberculosis, cachexias generally, where there is a basal fragility of the cell-walls and consequent disposition to fall into disease easily, with little power to set up healthy repair, calcium salts are indicated, the sulphocarbolate as an intestinal antiseptic, the lactophosphate in similar doses to restrain colliquative discharges; the sulphide, gr. 1-2 every hour or two to check pus-formation; the hypophosphite, gr. 1-12 every waking hour as a tissue-builder, for months or years if necessary.

Anemia is best met by iron arsenate, gr. 1-67 and iron phosphate, gr. 1-6, repeated every waking hour.

When the secretions are scanty and dry the best remedy is the inhalation of steam, with lobelin or emetine internally, gr. 1-67 to 1-12 every waking hour, stopping when the desired effect is manifested or nausea supervenes.

If the secretion is profuse and purulent, calcium sulphide, gr. 1-2, strychnine arsenate, gr. 1-67, and macrotin, gr. 1-6, should be given together every waking hour till full effect, as indicated by the odor of sulphide on the breath, slight strychnine twitching, or physiologic tonicity of the the heart from the macrotin. The latter with the strychnine is intended to tone the relaxed mucous tissues and check the abnormal output of secretion. Possibly hydrastine gr. 1-67, added to each dose, would aid in this respect.

If the secretion is serous and profuse, there may be a general bronchopulmonary mycosis present, or the flow is colliquative, alternating with

a similar flow from the skin or the bowels. In the former cases calcium sulphide must be pushed to full toleration, with iodoform, gr. 1-6 to 1 every hour, to destroy the microorganisms; while sprays of eucalypti in fluid petrolatum, one part to eight, preceded by complete cleansing of the pulmonary tract by five minutes' inhalation of the fumes of boiling vinegar, should be repeated every two hours. Other antiseptic sprays have not given as good results, though one of camphor and menthol 23 grains, thymol 7 1-2 grains, and fluid petrolatum 1 oz, has often proved a valuable adjuvant. Strychnine to full tolerance, a highly nutritious diet, the air of the room charged with the vapor of the oil of cloves are also indicated.

When the bronchorrhea is colliquative the fever should be checked by calcium sulphocarbonate gr. 5, every hour or two, with equal doses of calcium lactophosphate which is almost a specific here, and guaiacol externally, five to ten drops diluted with cod-liver oil rubbed into the skin over the lung. The body should be sponged with vinegar. Strychnine is required in full doses, with macrotin gr. 1, every two to four hours. This powerful stimulation of tonicity will generally rouse the failing powers and keep the patient alive a while longer. And in these cases he wants every hour of life he can secure and is grateful for every day that he is kept alive, though death's pinions hover over him continually.

When the sensation of the bronchial mucosa is lost and the secretions collect, with cyanosis, drowsiness, etc., sanguinarine is the most effective remedy in doses of gr. 1-67 to 1-20, every one to two hours, until the patient is coughing sufficiently to rid his tubes of the redundant secretions.

If on the contrary the cough is excessive and there is little or no secretion to be expelled, the sedatives are required, codeine gr. 1-12 to 1-6; zinc cyanide gr. 1-67 to 1-20, the best and most manageable of the cyanide remedies; or Dover's powder as modified by substituting camphor monobromide for potassium sulphate and the alkaloids for opium and ipecac. The inhalation of steam is again a most essential remedy. Murrell advises spraying with wine of ipecac. We have utilized the suggestion but substituted a watery solution of emetine instead, gr. 3 to 1 oz. of water. The atomization of fluid petrolatum is also very soothing. A full dose of atropine, gr. 1-134, will often check the irritation, especially if the presence of marked dyspnea indicates the predominance of the spasmodic element. Counter-irritation over the pneumogastric nerve in the neck also often gives great relief.

Of the remedies usually administered for bronchitis very few are given with a definite idea of their true effects. A mixture is made of a number of the so-called expectorants, often antagonistic; these are swallowed at



lengthy intervals, until time has cured the patient or established the chronic malady. Ipecacuanha and cocillana relax the congested tissues, lessen hypersensitiveness and promote secretion. Squill and senega increase sensitiveness and aggravate the cough, increasing congestion. Tolu, copaiba, myrrh, the balsams and cubebs, check secretion, leaving an acute congestion unrelieved, but are effective in restraining profuse mucopurulent discharge. They have some effect also in clearing away the "dregs" of an attack, when it threatens to become chronic. Sugar, licorice, gums and mucilages, soothe pharyngeal irritation. I have given ammonium many times and have found no place for any of its salts that is not better filled by the agents above mentioned.

In fetid bronchitis the volatile oils are of great value, stimulating the imperiled tissues to fight off impending death. Oil of turpentine, eucalyptus, cajeput or sandal, should be given in doses of one-half to one gram (seven to fifteen minims), in capsule every one to three hours. Whether these agents are actually capable of stopping a pulmonary gangrene once begun is perhaps doubtful, but there is no more effective treatment known. Strychnine arsenate should, however, be pushed to full toleration, gr. 1-30 every one to three hours; the richest diet is to be ordered that the patient can take. Sprays of phenol 1-2 to 1 per cent in distilled water, should also be used often enough to prevent feter of the breath.

Pulmonary gymnastics may be of great value.

## BRONCHIECTASIS

Two forms of bronchial dilatation are found, the cylindric and the saccular. The dilated tubes form sacs, with smooth walls, communicating to form compound cavities, of all sizes. The cylindric epithelium lining normal bronchi is replaced by tessellated cells. The subepithelial tissues atrophy. Secretions lying in these cavities decompose causing irritation, inflammation, ulceration and the symptoms consequent.

**Etiology:**—Whenever a disease exists in the thorax that causes destruction of a part of the lung-tissue or its compression, nature supplies the vacuum by drawing in the intercostal spaces, approximating the ribs, dilating the air-cells or the bronchi. This process therefore may follow pleurisy with permanent compression of the lung, pneumonia or tuberculosis with destruction of tissue, chronic bronchitis with atrophy, and lobular pneumonia with atelectasis. The weakening of the bronchial walls by disease favors dilation. Straining from whooping-cough is more likely to produce emphysema, though Heubner thinks this affection and measles sometimes cause dilation. Rarely the malady is congenital, but



in such cases the true cause is probably lobular pneumonia. Bronchiectasis is more common in male adults.

**Symptoms:**—The symptoms depend on the presence of fluid in the sacs. If there is none, the only symptom may be shortness of breath, dependant on the quantity of pulmonary tissue destroyed. More frequently bronchiectasis is simply an incident in the course of the causal malady, whose symptoms are present. If the cavity fills with fluid it is apt to cause irritation and persistent cough until emptied. The sputa are characteristic of cavity-retention, and are separable in layers. Sometimes there is little sensibility and the cough only occurs when the patient lies down or turns to the sound side, when the contents of the cavity begin to flow into the trachea and are coughed up. Cavities may exist on both sides and be thus emptied successively. The sputa may decompose if long retained. The consequent ulceration may then cause hemoptysis. Retained sputa consist of mucus, pus-cells, Charcot-Leyden crystals, fat-crystals in bundles, leptothrix, vibriones and various bacteria. Elastic fibers indicate ulceration and destruction of the pulmonary parenchyma.

The chest wall is usually retracted. Percussion is flat, dull if the cavity is filled, tympanitic if empty, abnormally clear sometimes from the accompanying emphysema and air in the cavity. Auscultation gives a weak vesicular sound, and various moist rales dependent on fluid present. The majority of pulmonic cavities are, at least in the beginning, bronchiectases.

#### BRONCHIECTASIS

History of chronic bronchitis, pleurisy or other malady with diminished thoracic contents.

Cough paroxysmal,  
Sputa of cavity, copious,  
No tubercle bacilli,  
General health good,  
Little or no fever,  
Long course,  
Persistent, quiet, located near base posteriorly.

#### TUBERCULAR CAVITY.

History of attack, emaciation, sweats, hectic, predisposition, infection,

Cough morning and evening, nummular sputa,  
Tubercle bacilli,  
Progressive debility,  
Fever,  
Shorter course,  
Progressive; near apex.

Empyema with pneumothorax has the history of pleurisy with sudden discharges of much purulent sputa at long intervals. Actinomycosis is diagnosed by the microscope.

**Prognosis:**—That of the causal malady. The supervention of tuberculosis or of streptococcus-infection is disastrous.

**Treatment:**—The treatment is of the causal infection. The cavity should be kept as clean and as nearly aseptic as possible, by the inhalation of steam medicated with benzoin, phenol, turpentine, thymol or camphor, and atomizing fluid petrolatum with eucophen, 1 to 8, afterwards. Iodoform, terebene or eucalyptol may be given internally with benefit. The cavities have been injected with iodine or silver solution through the chest-wall, and drained by the surgeon, with great advantage.

## BRONCHIAL STENOSIS

The bronchi may be narrowed by constriction in the walls, or compression from without. Foreign bodies, polypi, pulmonary growths and exudates, aneurisms, cysts, tumors, enlarged glands, abscesses and pleural effusions are among the causes. The pressure induces dyspnea in proportion to the importance of the bronchus compressed. The dyspnea is persistent and progressive until the cause is relieved. A similar condition obtains to that seen in croup, the air in the obstructed region being rarefied, and the affected part retracted on inspiration. Other symptoms depend on the causal disease. Edema and hyperemia of the obstructed lung follow as in croup. The respiratory movement and tactile fremitus are lessened, percussion clear, vesicular sound diminished, serous rales supervene with the oedema. The diagnosis is made from the limitation of the physical signs, the history of the antecedent affection, and the absence of tracheal or laryngeal symptoms. The prognosis is generally bad. The treatment is that of the cause. It is obvious that bolder surgery will be the rule than in the past history of such maladies.

## ASTHMA

A neurosis, consisting of paroxysms of spasmodic contraction of the bronchioles, causing dyspnea. This is pure asthma, but we often find hyperemia, mucous exudations, affections of the nose or throat, emphysema, cardiac lesions, gout, rheumatism, syphilis, nephritis, and medullary lesions accompanying asthmatic seizures.

**Etiology:**—A peculiar predisposition exists, as many with similar lesions are not asthmatic. This malady is often hereditary. Toxemia supplies the irritant, the affected nerve endings being the points of lowest vital resistance. Among exciting causes may be named bronchitis (cause



or effect), the inhalation of irritants, vapors, dusts, fogs, animal or plant exhalations, and all sorts of emotional excitement. Asthma is more common in males and the paroxysms occur more frequently in cold weather.

**Symptoms:**—Prodromes occurred in one-half of Salter's cases, such as emotional vagaries, headache, neuralgia, vertigo, somnolence, vasomotor tension with diuresis and digestive disorders. Autotoxemia accounts for most of these. The attack usually occurs during sleep, tending to recur at the same hour. The symptom is dyspnea, wheezing for breath, the patient feeling as if the air entered the lungs just so far and then stopped. He struggles for breath, becomes pale or cyanotic, livid, temperature subnormal, pulse weak and fast, cold sweat, great depression, feels as if about to die, but never does so in simple asthma.

The chest becomes rounded, the respiration falls to 12, its rhythm is disturbed, inspiration short, expiration prolonged. The diaphragm is lowered and expansion limited. Palpation gives normal results and percussion shows the chest to be hyperresonant, especially if emphysema is present. The wheezing expiration is audible at a distance, with dry rales until near the close of the paroxysm, when serous rales are heard.

The paroxysms last minutes, hours, days or weeks, with diurnal remissions. They end abruptly with expectoration of mucinous molds of the small tubes, known as Curschmann's spirals. Leyden's octahedral crystals are often present in the sputa, and very large numbers of eosinophile leucocytes. These are found in excess in the blood during the attacks. Later the sputa contain pus.

**Diagnosis:**—The history of previous attacks, absence of evidences of structural disease, abrupt cessation of the paroxysms, inspiratory dyspnea, and the presence of the spirals in the sputa, are clearly diagnostic.

**Prognosis:**—Death rarely if ever occurs from pure asthma. The paroxysms recur at regular intervals, a group of nightly attacks being followed by long exemption. Chronic bronchitis and emphysema are in time developed, when the malady may become practically continuous. Complete recovery is also very rare, unless the patient removes to a suitable climate.

**Treatment:**—An emetic or cathartic may relieve the paroxysm by removing the cause. The most speedy relief ensues from a counter-irritant or ice, applied over the pneumogastric nerve in the neck; or from glonoin, gr. 1-250, atropine, gr. 1-500, and strychnine arsenate, gr. 1-134, given together every fifteen minutes till relief ensues. Very many other remedies have proved effective in relieving the paroxysms, including nauseants, antispasmodics, stimulants, anesthetics, analgesics and others, many acting through suggestion. The use of chloroform, alcohol, mor-



phine and other habit-drugs, affords prompt relief, and as the paroxysms surely recur, causes dangers infinitely greater than the asthma. They are unnecessary and should never be used.

When the paroxysms are prolonged, continuous or quickly recurrent, the patient should be brought under the full influence of strychnine arsenate. This may require doses of gr. 1-30, repeated three to ten times a day, till the full effect is manifested and the malady controlled; and this effect should be sustained until it is found that the doses can be gradually lowered without recurrence of the paroxysms. Maximal dosage has been sustained for weeks with the best results. The use of this remedy in moderate doses, increased carefully but fearlessly, offers the best known means of breaking up the disease and effecting a permanent cure. Of course this does not refer to accompanying organic maladies, each of which requires its own treatment. The bowels, kidneys, diet, personal and domestic hygiene, should also be regulated.

When the causes of the paroxysms are known they must be avoided, for habit is potent here as elsewhere. If any climate is asthmatic for an individual he may have to choose between continuing to be asthmatic, and finding a climate where he will be free. Individual idiosyncrasy rules here. The smoky air of Pittsburg may be better for some persons than the pure air of Chicago.

Emphysematous cases and those accompanied by heart-disease are benefited by potassium iodide in full doses, gr. 40 or more daily. The theory that regards asthma as the local manifestation of a general toxemia leads to investigation of the causes of toxemia. In one case this proved to be a pelvic abscess, whose removal was followed by a cure. Fecal retention and defective renal elimination should be relieved. Patients are too apt to settle to niter paper or nostrums and chronic invalidism.

The pathology that is based solely upon post-mortem findings is imperfect, in that it deals only with completed processes that have resulted in the extinction of life. As we are somewhat fond of saying, it has to do with the ashes of a burned-out fire. To us as physicians the greater interest centers in morbid processes that have not as yet passed the point at which recovery is impossible. Morbid anatomy can not take into account any of these functional alterations that are not yet expressed in permanent lesions recognizable in the cadaver.

The study of the evidences of disease as presented in the living subject is, however, difficult, and imperfect as our knowledge of normal physiology is by no means complete. Even in that easiest of all regions to examine the abdomen, we are confronted by Tait's brutal dictum—"if you want to know what is the matter with a woman, cut her open and find out."

As the study of definite, uniformly-acting remedial agents progresses, we should have an inestimable means of verifying the conclusions reached by clinical study and physical examination. As we know positively what these drugs will do, we may prove our conclusions and correct them by applying the therapeutic tests. From this standpoint we present some consideration on that opprobrium of medicine, asthma.

The wretched thing! It does not kill—usually. It presents no opportunity for surgical intervention—the boldest surgeon has not yet resected the vagus. It is simply a functional neurosis without adequate anatomic basis, and yet we are hopeless before it. In fact, few patients bother the regular physician about it, having long since found him impotent. They burn powders, quack, and fly over the earth in search of a climate where the breath of life can be drawn in comfort.

The classic descriptions of asthma do not fit the cases that come to the writer. There are no paroxysms occurring at night and leaving the patient free after a period of suffering. Instead of that we have a patient who, at any time of the year, catches cold. It's a small affair, only instead of running the ordinary course, like whooping-cough it gets worse when it ought to be getting better. There is scarcely any sputa, and very little froth, no sputa cocta forming. The cough grows large until the patient seems to be coughing herself to pieces. The cough brings on dyspnea, relieved by smoking. The dyspnea comes oftener and lasts longer, until it is continuous and so remains for weeks without intermission save what may be afforded by treatment.

Spasm of the muscular fibers of the smaller bronchioles? Can spasmodic muscular contraction persist for weeks? Is it not in its essential nature paroxysmal? The most skilful clinicians fail to detect any lesion or disorder of the heart that would warrant us in classifying this as a cardiac asthma. The symptoms culminate in a condition that strikingly resembles a double pneumonia but with no fever. At the height, the diagnosis of general pulmonary fibrosis seems fully justified. After some weeks in bed the grasp of the demon relaxes and recovery ensues, still closely resembling true pneumonia. The sputa have shown meanwhile a few strepto- and staphylo-cocci, and the diplococcus always present in the saliva.

Constipation, autotoxemia, bad breath and indigestion are always present, and the daily elimination of solids by the kidneys rarely reaches 600 grains. Every meal, every development of flatulence, is followed by aggravation of the dyspnea. In the lighter stages the patient may be easy while sitting up, but the cough and dyspnea follow exertion, and occur whenever she lies down.



Now let us see how the spasm theory is confirmed by the results of precise medication. We have in atropine a certain sedative for pneumogastric irritation; we give this agent until the mouth is dry, even until the face begins to redden, but there is no relief. Then it cannot be pneumogastric irritation we are treating. Take up the hypothesis of muscular spasm, and nauseate to full relaxation with lobelin. Can any such spasm resist that? We know it cannot—but this does. Force a free mucous secretion of the respiratory mucosa, with apomorphine (given by stomach so as not to nauseate), and still no relief. The old antihysterics, valerian, asafetida and similar agents are absolutely powerless here. There is no excess in vascular tension to indicate the powerful sedatives, and in fact the pulse is feeble and soft. Morphine in small doses fails, in full doses may afford a few hours' sleep or induce narcotism, but the following headache is so intense that the patient rather endures the loss of sleep that drives her to desperation. All hypnotics fail, even hyoscine. Every therapeutic attack based on the spasmodic hypothesis proves unavailing. Chloroform and ether anesthesia, like the ethers and alcohols by the stomach, add to this long list of failures. The only relief comes from smoking saltpeter and stramonium, and the dyspnea recurs more and more frequently, the relief is less decided and lasting.

Glonoin gives relief. Why? If it were as an antispasmodic, others of that group should do so, but they don't. If it be by relaxing vascular tension—there was none apparent and veratrine should prove even better. There is a little relief from the latter, but not commensurate with the depression it here causes, unless guarded by strychnine. But the glonoin relief is too sure and decided to be accidental, and we may find some light by studying this fact. Primarily glonoin acts by relaxing vascular tension. This may give relief—it usually does—by thus opening a way for blood to flow out of congested areas. Its action seems to be on the terminal arterioles and capillaries, since it does not depress the force of the heart like aconitine, and hence we get relief from glonoin which we cannot secure from directly stimulating cardiac inhibition. Can we correlate with this the relief obtained by smoking? This is not at all due to relaxation such as follows tobacco smoking in persons not inured to that poison. Relief ensues quickly after a few inhalations of the smoke and is not attended by nausea. It follows smoking stramonium and niter, or the latter with ordinary insect powder, but not smoking tobacco to nausea.

The remedial effect seems to be due to direct stimulation by the local action of the smoke in the pulmonary alveoli or bronchioles. But if relief



is due to local stimulation, and to the glonoin peripheral dilatation, how can the condition be one of spasm, either direct or local, of the muscular fibers or of the nerves, peripheral or centric? It begins to look as if we are dealing with a condition of paresis instead of spasm.

We shift our hypothetical stand from spasm to the vasomotors, and will apply our therapeutics to an assumed local vasomotor paresis in the affected region. Those who are accustomed to the use of active principles employ as every-day remedies two important triad combinations. Burggraave's dosimetric triad contains aconitine and strychnine arsenate, half a milligram each, and digitalin a milligram. Abbott's defervescent triad contains half a milligram of veratrine instead of the strychnine arsenate. The former is more powerfully contractile of the paretic vasomotor areas, the latter more directly relaxant of the exactly compensating spastic areas, both partaking of each of these antagonistic actions. In the asthmatic we pick our way cautiously with these two combinations, giving the sedative every hour, substituting Burggraave's whenever the heart asks for more power, returning to the Abbott triad whenever possible, for reasons evident on consideration of the essential importance of free elimination in this malady. One day's skillful handling of these two remedies sees our patient exhibiting a degree of improvement not credible except to eye-witnesses. The nervous irritability subsides, the cough and dyspnea are less severe and frequent, and the smoking—always of temporary benefit but in the end injurious to the delicate pulmonary structures—is required less frequently, until it may be substituted by glonoin. Add to this the most careful clearing of the bowels and other eliminants, scrupulous regulation of the diet and digestion, and the case soon wears a different aspect. Our vasomotor hypothesis has been confirmed thus far by the application of exact therapeutics on that basis.

Now then:—Lay aside all other considerations, and directly attack the disease as expressed by a local pulmonary, non-inflammatory, non-microbial vasomotor relaxation. To contract the paretic area we give strychnine arsenate, beginning with a milligram every four hours, increasing with close attention to the pulse-tension. The improvement is sure and steady—but the doses required may seem perilous. We may reach ten milligrams—gr. 1-6—every four hours, or a grain *per diem*, or more, before we have fully neutralized the paresis and restored normal vascular tension, and this enormous dose may be continued for weeks or months, lowering it as the need subsides. The arsenic possibly acts here as an intestinal antiseptic—its power of promoting fatty degeneration of morbid products which renders it so useful in declining inflammations, does not seem to be here indicated. Yet, there is too much testimony as to its

value in chorea, and we do not know *all* about asthma yet. But if arsenical symptoms appear we may substitute any other salt of strychnine, the nitrate or valerianate being possibly more active as renal stimulants. One great side-advantage of the huge doses of strychnine is its powerful action on the bowels, increasing sensibility and peristalsis and thus preventing the retention of feces, and autotoxomia. But it is not the ideal remedy, for by its use we are acting on every function and every organ in the body when we only need to stimulate the pulmonary vasomotors. Give us a remedy that will contract the vessels of the pulmonary circulation without affecting the greater circulation. Can we find this in the persalts of iron? Ergot and adrenalin act only on the larger circulation, not on the lesser. Hydrastinine and stypticin act selectively on the uterine area. Such selective action seems to indicate similar selection on the part of other vasomotor agents and among these there must be one that meets our requirements. But it is not to be found among the hemostatics, for atropine acts thus in stopping hemoptysis but is useless here.

If asthma is simply a spasmodic neurosis and nothing more, it is difficult to explain how patients can take a grain and more of strychnine daily with unquestioned benefit, instead of showing aggravation of the spasm with doses below those borne by healthy individuals. But if this remedy antagonizes and is antagonized by the disease we can readily comprehend why the asthmatic is benefited by doses that would be lethal to ordinary persons.

The results of treatment with therapeutic certainties seem to justify us in removing asthma from the category of spasmodic functional neuroses to that of the vasomotor pareses.

## FIBRINOUS BRONCHITIS

This is a rare malady in which fibrinous casts of the bronchi are formed, and expelled with difficulty. The casts form molds of the bronchial tree. The larger ones are hollow. The epithelium is shed with the cast. Anders found the casts identical in structure with ordinary croupal exudates.

The cause is not known. Streptococci have been found in the casts. The malady is more frequent in males, between 20 and 40, in spring, sometimes seems epidemic and may be hereditary. Tubercle, pleurisy, herpes, impetigo, and pemphigus have been noted as complications.

The rare acute form begins with rigors, followed by fever, dyspnea and severe cough. The expulsion of the casts may be followed by hemorrhage. Free expectoration gives relief. Urgent dyspnea and severe dry cough may precede fatal asphyxia.



In the chronic or recurrent form paroxysms occur at intervals of a week to a year, regular or not, the onset resembling that of bronchitis, cough severe and paroxysmal, and the white or gray casts appear. They consist usually of mucin, some of fibrin.

Physical examination shows the affected lung to be airless; fremitus, expansion and vesicular murmur lessened, percussion normal or hyper-resonant, dull if collapsed, the ejection of the casts restoring the normal murmur.

The diagnosis is made by the casts, the history differentiating them from croup and diphtheria. Doubtful cases may be settled by a search for the Klebs-Löffler bacillus of diphtheria.

In the acute form the prognosis is grave. The chronic form is obstinate but rarely fatal.

The treatment is as yet unsettled. Anders obtained good results from pilocarpine in one case. Cyanosis calls for emetics. Steam inhalations and the treatment for bronchitis are advised. If pilocarpine is given it should be in doses sufficient to cause free sweating, gr. 1-20, every ten to thirty minutes till effect. Potassium bichromate may be tried, gr. 1-30 every half-hour; or calx iodata, gr. 1-3 every five minutes.

Dr. S. R. Cates, of Abilene, Texas, after suffering for years with recurrent attacks of fibrinous bronchitis obtained relief and eventual cure from the use of hyoscyamine, beginning with the first evidences of an attack and keeping himself slightly under the influence of this agent until the malady had subsided.

## IV. DISEASES OF THE LUNGS

### PULMONARY HYPEREMIA

Collateral hyperemia exists in the unaffected lobes during pneumonia. The blood-vessels of the lungs are acutely congested, the epithelium swollen and granular. It is the first stage of pulmonary inflammation and may be excited by the inhalation of hot air, irritant gases, violent exercise or emotion, or the excessive ingestion of liquids, especially alcohol.

There is a sense of oppression, of lack of air, with a cough, frothy bloody sputa and soreness in the chest. Examination shows both lungs usually affected, with increased tactile fremitus, some decrease in the clearness of percussion resonance, diminished vesicular respiration, some bronchial breathing, and moist rales varying with the quantity and consistence of the fluid present. Respiration is markedly increased in rapidity, and there is apt to be some fever, the pulse corresponding.



The prognosis is rendered grave by the supervention of pulmonary edema.

The patient is put to bed, the bowels emptied, free perspiration induced by pilocarpine, gr. 1-30 every five minutes till full action is manifested, and the pulse brought down to 60 by veratrine and amorphous aconitine, gr. 1-134 each, with digitalin gr. 1-67 to contract the dilated pulmonary vessels, given together every quarter to one hour according to the urgency of the case. If the patient is weakly strychnine arsenate in like doses should be substituted for veratrine. Meanwhile the irritating, racking cough may be checked by codeine and emetine, gr. 1-67 to 1-20 each, every half to one hour. If the volume of the blood is reduced by the purge and sudorific, and the patient is not permitted to restore the congestion by the free use of beverages, it will not be necessary to bleed, locally or generally. But if edema of the lung is imminent—*bleed—BLEED—BLEED!* Nothing else will act as quickly to save life. The fear our fathers felt in regard to loss of a little blood was preposterous.

Arterial tension may require a few doses of glonoin at first, to let in the veratrine more speedily, and let out the blood from the hyperemic area.

Bleeding may also be required in passive congestion from heart diseases. The posture should be frequently changed to avoid hypostatic congestion.

## PULMONARY CONGESTION

Passive congestion occurs mechanically as a result of mitral or aortic disease, obstructing the outflow of blood from the pulmonary capillaries. Compensatory hypertrophy of the right ventricle sustains the aortic circulation but increases the pulmonary congestion. Some cerebral maladies give rise to this condition, which may also be caused by the pressure of tumors upon the pulmonary veins.

The blood-vessels of the lungs are distended, the lungs swollen and engorged, the connective tissue hyperplastic in old cases, the air-cells compressed and oxygenation correspondingly diminished. The process begins at the base of the lungs.

Dyspnea is pretty constant, a sense of stuffiness, with a disposition to take long breaths occasionally. This is worse after meals, as the bulk of the blood is then increased. Bronchial catarrh develops, but without this the engorgement causes constant irritative cough with serous or bloody sputa. The lips are stained as if the patient had been eating mulberries. Shortness of breath increases with exertion.

The diagnosis is unmistakable when cough, dyspnea and hemoptysis with deficient oxygenation coincide with valvular heart-disease.

The term hypostatic congestion is used to designate a condition, most common in typhoid states, when the lower portions of the lungs become water-soaked, or dropsical. The general vitality is low, the vascular tension so reduced that the blood-serum oozes through the vessel-walls and collects in the most dependent parts. When the position is changed the serum slowly shifts, collecting in what has become the lowest part. The air-cells and parenchyma become alike overflowed with serum. This is sometimes seen in aged and very feeble people, especially when in the last stages of exhausting disease.

The symptoms may be unnoticeable—unusual weakness, somnolence, pulse weak, respiration a little hurried, the mouth open and accessory respiratory apparatus brought in use, and deepening cyanosis. Examination shows the lungs dull in the dependent parts, serous rales, loud or fine bronchial breathing, increased fremitus, the signs shifting when the patient's position has been altered for a few hours.

In both forms of passive congestion the prognosis is that of the primary affection.

**Treatment:**—In mechanical congestion the treatment is that of the causal malady—and in fine this means the reduction of the heart's work to the lowest possible limit by the imperative restriction of fluids, so as to reduce the bulk of the blood. Richardson sought to relieve the dyspnea and aërate the blood by the use of hydrogen dioxide internally, but this could be better done by disengaging in the air of the patient's room an extra quantity of oxygen.

Those liable to hypostatic congestion should be changed about every few hours, the heart and arterial tone sustained by strychnine in full doses, with berberine, gr. 1-6 every hour to increase capillary tonicity. Apocynin in the same dose aids in carrying off the surplus water. Feed richly, keep the blood circulating by massage, with stimulating liniments. Be wary about allowing the patient to lie half-asleep for long periods. Sanguinarine in small and repeated doses, gr. 1-67 to 1-20 every two to four hours, stimulates the vitality of the pulmonary tissues and is consequently of special value in this condition.

## PULMONARY EDEMA

In many morbid conditions blood-serum is effused into the air-cells and pulmonary tissues. It forms a zone around pneumonic, purulent, apoplectic and tubercular masses. It is an incident in the history of nephritis, anemia, apoplexy, acute septic fevers and many cardiac maladies. In pneumonia collateral hyperemia and edema of the lobes not pneu-



monic form a serious element of danger. In true croup edema is the cause of death. The occurrence of edema is favored by any agent that causes abnormal fluidity of the blood, overfilling of the pulmonary capillaries, increase or decrease of the tension of the pulmonary blood-vessels, or innutrition of their walls.

Dyspnea is the first symptom, and is severe in proportion to the extent of the malady. Cough, frothy, sero-sanguineous expectoration, cyanosis with sluggishness, somnolence and finally death by carbonic acid poisoning, are the steps in the general pulmonary edema. The pulse is weak and rapid, skin cool and livid. The degree of fever depends on the causal malady. The percussion note is dull if the edema is marked; auscultation discloses moist rales of varying degree, beginning in the finest bronchi and becoming coarser as the serum invades larger ones, while the vesicular sound is weak or absent.

The condition is diagnosed from the history, incomplete dullness beginning in dependent parts, the progressively larger moist rales, frothy, bloody sputa, absence of fever and supervention of cyanosis if extensive. In hydrothorax the level of the dullness changes at once with change of posture, and there are no rales. Bronchopneumonia begins with fever, sticky gray sputa, and the dullness is marked, limited and stationary.

The prognosis depends on the primary disease. Collateral edema is a condition of imminent danger. In croup it is a herald of death.

**Treatment:**—Treat the primary malady. Change the patient's posture frequently to avoid hypostasis. Bleed for collateral edema in pneumonia. Intubate to prevent edema in croup. Feed up, stimulate, and neglect not the blood pressure. Dry cups over the chest are useful. Drain the bowels by exosmotic enemata—cold saturated salt solution. Give full doses of strychnine to contract relaxed vessels, especially in children.

## HEMOPTYSIS

Pulmonary blood comes usually from the bronchi—rarely in advanced phthisis it is from eroded vessels. At the post-mortem we find the latter, or ruptured capillaries, swollen mucosa, or a ruptured aneurism; the affected lung-tissue pale.

The causes of hemoptysis may be pulmonary hyperemia or congestion from any cause (heart disease, pneumonia, inhalation of hot air, violent exercise, etc.), infarction pneumonia, tubercle, ulcer of larynx, trachea or bronchi, fibrinous bronchitis, cancer and gangrene. Blood



may come from the nose or from other sources, enter the larynx during sleep and be coughed up to frighten the patient and mislead the doctor.

A free hemorrhage may first attract attention to a localized deposit of miliary tubercle. Much more frequently children who bleed at the nose during early life, after reaching puberty have bronchial hemorrhages instead. The effused blood decomposing in the bronchi, excites inflammation there, and this may form a suitable nidus for the tubercle bacillus. Too many young people have repeated bronchial hemorrhages, and yet live to old age without becoming phthisical, to permit of the gloomy prognosis of Laënnec in similar cases.

Rarely hemoptysis represents a vicarious menstruation. Purpura hemorrhagica, scurvy, pyalism, anemia, hemophilia, yellow fever and malignant malarial fever, may cause hemoptysis. Clarke found recurrent hemorrhages in aged persons from gouty endarteritis.

**Symptoms:**—In bronchial hemorrhages the patient feels a warm salty taste and blood wells up into his mouth, the quantity varying from an ounce to a pint. This is generally preceded, perhaps for days, by a sense of stuffiness in the chest, with pain or tenderness in the second right intercostal space, near the sternum. The patient is frightened, the pulse excited, full and rapid, perhaps tumultuous. Each new gulp of blood adds to the terror. During the day a second hemorrhage usually occurs, and if this is foretold by the doctor, with the assurance of its harmlessness, faith and composure follow. Otherwise another attendant is usually summoned. Blood is brought up for a few days, while the patient shows by fever the degree of damage excited by the dead blood in the fragile lung-tissues. If oppression has preceded, a feeling of relief and sense of well-being follows the hemorrhage. Rarely is the loss of blood sufficient to induce syncope and collapse.

When tuberculosis is advancing rapidly a large vessel may be eroded, in which case the succeeding hemorrhage is apt to be fatal. The blood in the above cases is arterial and frothy, not clotted. Bubbling rales may be heard on auscultation.

Similar hemorrhages may occur in passive congestions from obstructive heart-disease, etc., and spitting of blood or bloody sputa is common in any destructive pulmonary affection.

Small hemoptyses precede for weeks the rupture of thoracic aneurism, the latter causing sudden death.

Gouty hemoptysis occurs after 50, most commonly when bronchitis is present. Small hemorrhages occur in emphysema also, probably from ulcer.

Small hemoptyses occur in weak, hysterical women; others follow thoracic injuries, strains and violent emotions. Persons predisposed to tuberculosis are apt to have hemorrhages if they go to the seashore, and almost any one may suffer similarly on ascending to elevated regions or in balloons.

The diagnosis of pulmonary hemorrhage is made by ascertaining that the blood is coughed up, frothy, bright-red, the nose, mouth and throat showing no source of bleeding, the lungs revealing it.

The prognosis is good as to life. Very rarely does any one die from pulmonary hemorrhage except from erosion of an artery or bursting of an aneurism. But any discharge of blood from the lung demands the most thorough search for evidence of tuberculosis. If not found, if the week following shows little fever and the sputa are free from pathogenic microbes, the hemorrhage is still evidence of a fragility of tissue demanding instant attention. The immediate effect of a hemorrhage on the course of an acknowledged tubercular malady is beneficial. Simple blood-spitting is rather diagnostic than prognostic.

**Treatment:**—Place the patient at ease, the head somewhat elevated, with cold to the chest. Reassure him as to immediate danger, announce the return of another hemorrhage later in the day, administer a full dose of atropine, gr. 1-67, turn the people out of the room and order the patient to be kept cool and quiet. Forbid the patient's talking. If the sense of oppression is still present, apply a leech or cup over the second right intercostal space, close to the sternum, and subdue the bounding heart with aconitine or veratrine, "dose enough" to do the work. Keep the patient very quiet as long as any fever is present, feeding on small doses of ice-cream and the most concentrated nutriment, predigested if necessary. Forbid all fluid but what is absolutely unavoidable. For thirst allow pellets of ice, or chewing-gum. Examine the chest thoroughly. If a tubercular lesion is found treat that disease. Heart-disease, aneurism, etc., require their own treatment. In case of aneurism ice to the chest may delay death for a paltry period. In vicarious menstruation anticipate the next monthly epoch by active emmenagoges, and repeat this each month till it is no longer necessary.

If the most vigorous search fails to disclose evidence of pulmonary tuberculosis, while the history and aspect of the patient show the case to be one of tissue-fragility, predisposition to phthisis, the question is of prophylaxis. If a youth of proper age, a long sea-voyage, a year or more, is advisable. Calcium lactophosphate should be given, gr. 7 1-2 daily for a year; the bowels regulated, the digestion scientifically built up, the body invigorated and toughened by suitable exercise, cold baths,



salt rubs, pneumonic gymnastics, cod-liver oil inunctions, the climate suitable to the case, etc.

Whenever there is the warning sense of oppression the heart should be sedated by veratrine and a dry cup placed over the danger-point. If the symptoms recur quickly, introduce a seton through the skin wherever pain or fullness is felt.

The diet must be carefully suited to the case. A flood of hot soup or alcoholic beverages may bring on hemorrhage. All excesses that impair the vitality must be prevented. An out-door life, in an equable climate, as high up the mountains as the patient can comfortably endure, is the ideal. While emphatic in our view that these cases are not necessarily tuberculous, we grant freely their liability to become so, and the regime enjoined is that employed to prevent the development of tuberculosis. This point is of the utmost importance, for many a doctor and patient, convinced by the hemorrhage of the preëxistence of tuberculosis, have allowed the cases to go by default that might otherwise have lived to a healthy old age.

We have dropped all the old hemostatics for atropinæ. By forcibly dilating the cutaneous capillaries this drug attracts the blood to the surface and reduces the congestion of the internal organs. If the blood is safely held at the periphery it cannot at the same time be escaping from engorged vessels in the lungs. Besides this, atropine sedates the pneumogastric and checks the cough. While it is in a sense antagonistic to the arterial sedatives recommended, aconitine and veratrine, actual trial has confirmed the apparently paradoxical claim that such antagonists will act in the same body at the same time, each exerting its special force where needed. It is well to accompany the atropine with a few doses of glonoin, gr. 1-250 every ten minutes, to relax arterial tension, open the vessels for speedier action of the other drugs, combat the tendency to syncope and attract the blood to the head, where it is held by the slower but more persistent atropine. The only effect of astringent sprays is upon the mentality of the patient, for by no possibility can they reach the bleeding orifices.

The persalts of iron tend to restrain hemorrhages in the pulmonary tract; protosalts to induce them.

## PULMONARY APOPLEXY

Sometimes there is an escape of blood into the lung-tissues, similar to a cerebral apoplexy. It occurs from rupture of an adherent aneurism, from wounds, and in some cerebral and septic maladies.



There is profuse hemoptysis, great dyspnea, cyanosis, collapse and signs of consolidation suddenly following the causal lesion. It ends in death at once, or after abscess or gangrene has supervened.

The treatment is absolute rest, cold locally, and atropine in full doses hypodermically, gr. 1-67, at once.

## PULMONARY EMBOLISM

A pulmonary artery is blocked by an embolus. The lung supplied becomes engorged with blood, airless, dark, the pleura covering the base of the wedge inflamed, and a zone of edema surrounds it. If the embolus consisted of septic matter the part breaks down into an abscess. In leucocythemia plugs composed of leucocytic masses form small emboli. Vegetations loosening from the valves of the heart sometimes enter the lungs.

Small non-septic emboli may occasion no symptoms; large ones may cause speedy death with symptoms of pulmonary apoplexy. The usual symptoms are dyspnea, syncope, pleuritic pain, spasms and coma. The dyspnea occasions great distress and struggling for breath. Bloody expectoration occurs early. If a cardiac murmur ceases, with the sudden development of localized pneumonia, hemoptysis, pleuritic pains, preceded by convulsions and unconsciousness, the diagnosis is clear. Small infarctions may not cause dullness; large ones do, with moist rales, increased fremitus and bronchial respiration, with pleuritic friction. The pulse is weak and rapid, skin cool, the forces prostrated. Fever follows reaction in large infarctions.

The prognosis depends on the nature of the embolus and the importance of the vessel occluded. If abscess or gangrene occurs death quickly follows. In case of recovery the affected part shrinks, forming scar-tissue, or calcifies.

The treatment consists of rest, careful feeding to support the strength, and anodynes to ease the pain. Atropine may be given for this purpose, with codeine enough to prevent painful cough, and anodyne applications to the skin.

## BRONCHOPNEUMONIA

In capillary bronchitis we find evidences of inflammation of the smallest bronchi and the air-cells. Dark patches are found, surrounded by healthy tissue, the one exuding mucopus when cut, the other serum. The large bronchi are healthy, the smaller ones contain secretions, the walls thick, dilated, the cut surfaces nodular. Large areas may be almost wholly

consolidated, airless, at first reddish, later gray. Both lungs are affected in parts. The bronchial glands are inflamed, the pleura somewhat also, the air-cells of other parts of the lungs dilated. The malady begins as an inflammation of the cells and bronchioles constituting a lobule, new tissue being formed therein, the malady tending to chronicity. The exudate consists of serum, mucus, alveolar cells, leucocytes, and a few red blood-cells. The leucocytes in the blood multiply, except in fatal cases. Concomitants are bronchial catarrh and exudative inflammation of the air-cells.

**Etiology:**—The malady is most frequent among children, and with measles, rickets, scarlatina, whooping-cough and diphtheria. Excitants are exposure to cold and wet, bad air, bad hygiene and digestive derangements. A form of bronchopneumonia also prevails among the aged, enfeebled by disease. It is most prevalent in cold, wet seasons, occurs with influenza, typhoid fever, erysipelas and smallpox. The inhalation of irritants seems to excite attacks, as does the tubercle bacillus.

Streptococci are frequently found in the sputa, also pneumococci, staphylococci aurei, influenza bacilli and numerous other microorganisms.

The malady following acute infectious fevers is now believed to be usually tubercular.

**Symptoms:**—Primary forms, occurring usually in adults, present symptoms of severe acute bronchitis. In weak patients the onset may be gradual. The sputa is scanty and sticky, gray or blood stained, fever  $101^{\circ}$  to  $104^{\circ}$  F.; irregular but higher in evenings, ending by lysis in two to four weeks.

More common is the secondary form, the early symptoms masked by the previous affection. The malady extends down from the larger bronchi and is marked by a sudden rapidity of respiration, with higher fever, harassing cough and expectoration. The pulse grows rapid, feeble and irregular.

Capillary bronchitis is indicated by subcrepitant rales, followed by some dullness, not limited to single lobes, but more marked in the back between the shoulder-blades. Dyspnea and duskiness of the lips are noted, the hurry of respiration is extreme, the eyes and finger-nails are blue. The respirations are shallow. The fremitus is increased, breathing is bronchial, yet the consolidation is rarely as complete as in lobar pneumonia.

Unless death comes sooner the attacks last from one to several weeks.

In the cerebral form there are at the outset restlessness, convulsions and delirium or stupor, early high fever, followed by prostration. Some days later the pulmonary symptoms replace the cerebral. There



may be gastrointestinal disorders in any form. Some cases run on for many weeks, the consolidation remaining. In fact, the affected areas may remain permanently solidified. The fever may be irregular. Other cases develop like lobar pneumonia, with chills, high fever, pain in head, chest and back, marked prostration following with the usual symptoms in aggravated form. In another group the onset is insidious the course chronic, hectic fever and night-sweats following.

The diagnosis between this affection and lobar pneumonia is not as a rule difficult. Lobar pneumonia begins abruptly with a chill, there is crepitation followed by dullness limited to one or more lobes, rusty sputa, typical fever, ending in crisis; it is often unilateral, without bronchial catarrh or severe dyspnea; the pneumococcus is present. Bronchopneumonia develops usually out of one of the maladies named, begins gradually with bronchitis preceding, the dullness is bilateral, not absolute, not limited to the lobes, but most marked between the scapulæ; subcrepitant rales, respiration hurried, great dyspnea and cyanosis, fever irregular ending by lysis, course prolonged; sputa glairy, in adults blood-spotted; often ends in tuberculosis; streptococci and other microorganisms than pneumococcus are present.

Pleurisy has dullness at the base of one or both lungs. In tuberculosis the bacillus is present.

The prognosis is grave in proportion to the weakness of the patient and the extent of the disease. The mortality varies from 25 to 50 per cent.

**Treatment:**—Attacks may be prevented by guarding against colds during and after the affections above named. The mouth should be regularly cleansed with antiseptic lotions during all septic fevers.

Perhaps no other remedy counts for so much in this malady as the constant inhalation of steam. The chest should be painted with tincture of iodine and enveloped in a cotton-jacket. The more acute cases require veratrine, aconitine and digitalin for the fever, changing the veratrine to strychnine arsenate at the first indication of debility. The adult dose is gr. 1-134 of each, except of digitalin, which is gr. 1-67 every half, one or two hours, according to the pulse and the fever. For children under ten Shaller's rule is applicable: Put in a glass one adult dose for each year of the child's age, add one more, and 24 teaspoonfuls of water; then give a teaspoonful as often as required. Thus, a child one year old would take two-twenty-fourths of the adult dose, a child 8 years old nine twenty-fourths.

The bowels must be emptied and kept soluble, the strength supported by judicious feeding, the alimentary canal kept aseptic.



Will any agent favor resolution and fluidify the exudate? Calomel, ipecac, ammonium chloride, apomorphine, lobelia, potassium bichromate, each has been faithfully tried without giving convincing proof of its utility. One case responded promptly to ammonium iodide, another to strychnine in desperate doses; and we would to-day prefer the latter to any other remedy. Opiates in all forms are deadly. The cough will be better relieved by steam. The inhalation of oxygen may tide over a case. Injections of normal salt solution may be of value.

An emetic may be required occasionally to free the lungs of secretions. If there is difficulty in expelling it, the remedy is sanguinarine.

## CHRONIC PNEUMONIA

Cirrhosis or fibrosis of the lungs occurs in two forms, local and diffuse. It is unilateral. The history is that of cirrhosis elsewhere—there is hyperplasia of the connective tissue, which later contracts, both processes being at the expense of the air-cells and glandular elements, whose space is seized first and which are choked out by the contraction. The affected part of the lung is converted into a fibrous, scar-like mass, occupying less space than when healthy. The vacated space may be filled up by retraction of the intercostal and clavicular spaces, emphysema, bronchiectases, and the heart may even be drawn over towards the affected region. Adhesions may form. Tuberculosis may follow.

The affection is secondary to various inflammations, tubercle, syphilis, hydatids, etc. The diffuse form follows acute pneumonia with missed crisis, influenzal pneumonia, pleurisy, atelectasis and especially bronchopneumonia.

The process begins in the submucous layers and extends into the parenchyma. It may arise primarily or from the inhalation of irritants.

The symptoms are cough, expectoration, early dyspnea, worse on ascending heights, oppression, pain if the pleura is involved. There is no fever. Other symptoms are due to the accompanying conditions.

The chest-wall is shrunken, or swollen with emphysema; the side may be distorted to bring the ribs closer, the spine curving, the heart displaced. The fremitus is increased, percussion dull, breathing bronchial, with signs of bronchiectasis if present. Rales depend on the presence of fluid.

The malady is slowly progressive. Acute pneumonia may occur.

There is no known curative treatment. The efforts of the physician should be directed to securing the patient's comfort, treating complications and prolonging life.

Thiosinamin is said to possess the power of destroying scars, and even of causing the absorption of urethral strictures. It may check pulmonary fibrosis. The dose is gr. 7 1-2 in fifteen per cent alcoholic solution, injected into the gluteal tissues. The severe pain is alleviated by drawing the solution into the syringe and then a few drops of four per cent cocaine solution, which is thus first injected. Singularly, the anesthetic action of the cocaine is manifested immediately. The dose should not be repeated more than once a week. Euophen with fluid petrolatum, one part to eight, should be sprayed into the lungs daily, as this agent also seems to have local absorptive powers that may be of value here. Thiosinamin is now advised by the mouth, a grain 3 to 5 times a day for months.

## ATELECTASIS

The term atelectasis denotes a permanent collapse of the air-cells forming a lobule. The affected lobule is solid, airless, dark, the bronchi occluded by exudate, but inflatable by the blow-pipe. The capillaries are distended.

**Etiology:** This occurs in new-born infants from imperfect distention of the lungs. In older children it is caused by stoppage of the bronchial lumen by exudates, the air being absorbed or expired. Compression of the lungs causes it, even that of flatulence. It also results from some cerebral diseases, pneumogastric paresis, and paralysis of the chest-walls. Distortions of the thoracic cage may be attended by atelectasis.

The symptoms occur during the primary affection, which is most frequently bronchopneumonia. Respiration is rapid and shallow, with dyspnea in older children, lividity and cold skin and extremities in new-born babes. The pulse is feeble and rapid, the cry weak, and carbonic acid poisoning ensues, insidiously in the case of infants.

If extensive, over the posterior lower lobes, this part of the thorax retracts during inspiration; the percussion note is dull, unless masked by emphysema; with vesicular murmur, weak bronchial breathing, sub-crepitant rales.

The diagnosis from lobar pneumonia is made by the location of the dullness, in the posterior part of both lungs, disseminated through all parts but most marked between the scapulae and in the lower lobes; by the dyspnea and cyanosis and the absence of the signs of true pneumonia.

If the process is extensive it is apt to be permanent, the function of the affected tissue being lost. In infants it is a dangerous affection.

With whooping-cough bronchopneumonia or pleurisy, it is often fatal. Emphysema simply masks the malady and adds to the injury.

The treatment is that of the causative malady. Inflating the lung forcibly should be practised to prevent or relieve the collapse; the position should be changed regularly. Infants must be made to cry vigorously. An effective measure is placing the child in a warm bath and squirting cold water forcibly against the chest. Sanguinarine is useful as a stimulant to the cough; the dose being gr. 1-134 every half-hour to a child two years old.

## EMPHYSEMA

Interlobular emphysema is due to rupture of the air-cells, the air escaping into the connective tissue. It may be due to wounds, violent coughing or sneezing and other strains. The most common locality is the clavicular region, which may puff up with escaped air. This may penetrate the pleura, or the subdermal tissue over the entire body.

Vesicular emphysema is a simple dilation of the air-cells without rupture. It is termed compensatory when it aids in filling up the vacuum caused by loss of part of the thoracic contents. It is only compensatory as to volume, not as to function, as the enlarged cell aerates but little more blood than the small, and not nearly as much as the group of cells normally occupying the same space.

Hypertrophic emphysema is due to permanent dilatation of the air-cells, by overstretching. The lungs do not collapse when the pleura is opened. Presumably there is in these cases a congenital deficiency of the elastic tissue.

The thorax becomes barrel-like, the lung-tissue anemic, pitting on pressure. The cells are notably large, of various sizes, pleura pale, showing patches devoid of pigment (Virchow's albinism). The septa are thinned and broken, the cells coalescing, the elastic fibers broken or atrophied, the capillaries disappear, the epithelium becomes fatty. The muscular fibers may become hypertrophied. The larger blood-vessels are enlarged. Bronchial catarrh usually coexists, with cirrhosis and bronchiectasis. The diaphragm is depressed, the heart lowered, its cavities dilated or hypertrophied, the pulmonary arteries enlarged and atheromatous. Other viscera show the effects of prolonged venous engorgement.

**Etiology:**—Emphysema in the upper lobes develops in whooping-cough, bronchitis, etc., from the violent strain of coughing while the glottis is closed. Asthma, playing wind-instruments, blacksmithing,



and other occupations involving similar pulmonary strain, cause emphysema. The loss of elasticity and atrophy of the tissues in old age gives rise to a harmless emphysema, and if contracted in childhood it reappears in old age.

**Symptoms:**—Emphysema being not so much a distinct disease as a process entering into the clinical history of various maladies, its symptoms are those of the latter. It slowly develops from occupations, but occurs suddenly as an accident from unusual strains. It causes dyspnea, dry cough, perhaps cyanosis, the breathing-power lessens on exertion or after full meals, becoming worse as the malady increases. Expiration is laborious and prolonged. In advanced cases the cyanosis becomes extreme. Expectoration depends on the coexistence of catarrh, which is a frequent concomitant, acute attacks developing a cyanosis not usual to bronchitis alone. There is no fever, the pulse is normal or weak, the temperature subnormal. The patient becomes thin, weak, stooping, cachectic. The right ventricle hypertrophies to force the blood through the fewer capillaries.

Besides the barrel chest, the winged scapulæ are characteristic, and a belt of dilated venules may be seen around the lower border of the ribs and cartilages. Hyperresonance is present, the vesicular sound is weak, expiration prolonged, and the cardiac dullness is obscured by overlapping lung. The unaffected parts give a harsh vesicular murmur.\* Bronchitic rales are usually present, with those due to any other complication. Dry crumpling sounds may be heard, or Laennec's rale, resembling the subcrepitant.

The diagnosis is made from the history, occupation, dyspnea, cyanosis, barrel chest and other signs. Pneumothorax develops suddenly, unilaterally, with violent dyspnea, clear tympanic note, amphoric breathing, soon followed by the splashing of liquid.

Acute emphysema is curable, the chronic form permanent and usually progressive, though the symptoms may be checked or show improvement under treatment. Patients are carried off by intercurrent disease, dropsy, hemoptysis, or sudden dilation and failure of the right ventricle.

**Treatment:**—Remove the cause. Treat the bronchitis. Potassium iodide has long been recognized as exerting a remarkably beneficial influence over emphysema. The dose is gr. 15, thrice daily. The causal occupation or habits must be given up. Cough must be held in check, colds prevented, asthma relieved, the bowels kept soluble, flatulence guarded against, and the nutrition sedulously maintained. The heart must receive careful attention. Sudden and urgent dyspnea may require venesection. Mechanical compression of the chest, by hand or

apparatus, has proved of service. Inhaling compressed air and exhaling into a partial vacuum is a promising method. When cyanosis becomes distressing, arrangements should be made for oxygen inhalation at the patient's convenience. Patients with emphysema are thought to do well in Minnesota, even in winter.

### PULMONARY GANGRENE

Diffuse gangrene in the lungs is rarely met in pneumonia. As a consequence of occlusion of a large artery a whole lobe or lung may be affected, the tissues becoming black, soft and putrid. Emboli cause circumscribed gangrene, more frequent in the right lung, and in the lower lobe close to the pleura. The tissues turn greenish brown, softening at the center into a cavity. A zone of inflamed tissue surrounds it and the discharge inflames the air-passages it reaches. The affection spreads by direct extension to lung and pleura, and secondary embolism may occur in the brain or elsewhere. The gangrenous patch may become encysted and the patient recover with a cavity.

The causes are putrefactive bacteria, staphylococci, lodging on pulmonary tissues whose vitality has been reduced too low for successful resistance. Gangrene occurs in the course of pneumonia, infarctions, bronchiectatic and other cavities, traumatisms, cancer, compression and embolism. Foreign bodies, food, etc., entering the lung are specially liable to cause gangrene. It occurs sometimes in convalescents and in diabetics.

The symptoms are cough, profuse intensely fetid sputa, separable on standing into three layers, an upper frothy gray-yellow, a middle clear serous, a low greenish-brown sediment containing shreds of lung-tissue, blood, bacteria, fat-crystals, mucopus, amorphous matter and leptothrix. Ciliated monads have been found. If the gangrene does not discharge by the bronchi neither fetor nor sputa may be present. Fatal hemorrhage may result from erosion of an artery. The physical signs are those of consolidation, with a cavity after evacuation; the usual rales from the bronchi or inflamed layer. There is fever of irregular type with great prostration and rapid wasting, death advancing rapidly.

The diagnosis is made by the unequaled fetor of the breath, peculiar sputa and rapid sinking.

The prognosis is grave in proportion to the extent and rapidity of the gangrenous process.

**Treatment:**—Spray or atomize with phenol lotions and volatile oils, as strong as can be borne. Give the latter internally in full doses, with



sanguinarine, strychnine and the richest possible diet. Just as soon as there is an opening for surgical intervention it should be embraced.

## PULMONARY ABSCESS

Abscess of the lung may be diffuse or circumscribed, of any size up to an entire lobe. If the pleura is reached there may be fibrinous adhesions, emphysema or pyopneumothorax. Streptococci, pneumococci, Friedländer's bacilli and other organisms have been found. Abscess has followed pulmonary inflammations (usually diffuse), perforations, embolisms, pyemia, emphysema, and usually attends chronic tuberculosis.

The sputa contain pus, and are fetid, but less so than gangrene, containing many elastic fibers. The cavity can be located if large enough. The fever is of the hectic type, with chills, perhaps daily. Leucocytosis is marked.

Pyemic abscess presents little hope. If the causal affection is amenable to treatment the abscess is a harmful event, not necessarily fatal.

**Treatment:**—Keep up the patient's strength with rich food, strychnine arsenate gr. 1-30, iron and quinine arsenates each gr. 1-6, every four, three or two hours; with all the resources of the reconstructive regime. Put a stop to the suppurative process by speedily saturating the body with calcium sulphide, one grain seven times or more each day, till the breath smells of the drug. Spray with volatile oils, thymol, eucalyptol and camphor-menthol, gr. 15 each in an ounce of fluid petrolatum, very often. Aspirate or drain large abscesses as early as practicable.

Give nuclein solution, ten minims every three hours, and in great depression add zinc phosphide, gr. 1-6 four times a day. The potency of these remedies is commensurate with the gravity of the situation.

## PNEUMONOKONIOSIS

Men who work in coal-mines inhale the carbon as dust; it is deposited in the lungs faster than the mucous cells can dispose of it, penetrates the perivascular lymph-spaces, is enveloped in the leucocytes, and conveyed to the lymph-nodules, interlobar spaces and lymphatic glands. Catarrh with emphysema may occur. More often interstitial inflammation is set up, resulting in fibrosis. Some of the indurated areas may soften, and then ulcerate if air is admitted. This ends in tuberculosis. All city-dwellers have some degree of this anthracosis, but not to an injurious extent.



Chalicosis, stone-cutter's consumption, occasions a similar affection. Tool-grinders suffer still more acutely. Siderosis applies to the malady as exhibited by dyers. Grain-shovelers, cigar-makers, cotton-spinners, millers, and all workers in dust-laden atmospheres suffer similar maladies, the symptoms varying with the nature of the dust inhaled. Polishers in watch-case factories, inhaling rouge, seem also specially liable to epilepsy.

The symptoms are those of bronchitis of varying grades, generally chronic. Emphysema follows. The sputa contain the dust, mucus, and in due time the tubercle bacillus. The microscopic examination and the history suffice for the diagnosis. The prognosis depends on the stage the malady has reached and the ability of the sufferer to secure healthier occupation.

**Treatment:**—One of the finest object-lessons is secured by covering the nose and mouth with a respirator of wet flannel, and breathing through it the air of the workshop. In a short time the respirator is so clogged that it must be renewed, or washed out and replaced. Its use prevents the malady. Nowadays many shops are properly ventilated and free from this evil. In others the owners advise the use of respirators, but find it difficult to induce work-people to use them. When the disease has begun the patient must leave the dusty shop for a fresh-air occupation. The treatment is that of bronchitis, etc.

## PULMONARY CANCER

All forms of cancer occur in the lungs, usually secondarily to its development elsewhere, the infection (?) being carried by the blood or lymph-vessels, or by extension directly. The causes are those of cancer in general.

The symptoms are pain (especially when the pleura is involved), inflammation excited by the growth, dyspnea and cyanosis. If the growth compresses the heart or great vessels the circulation is disturbed; pressure on the esophagus causes dysphagia, on the recurrent laryngeal nerve hoarseness or aphonia, on the trachea dyspnea, etc. The sputa contain blood, and may resemble currant-jelly, or be grass-green or putrid. The tumor causes dullness and loss of vesicular murmur. The thorax may be pressed out or perforated, the superficial veins engorged, and edema appears in the obstructed area. The cervical or axillary glands may be involved.

The diagnosis is made from the existence of cancer elsewhere, and the evidence of a thoracic tumor, steadily increasing, causing irrita-

and pressure-symptoms, the cancerous sputa, the lymphatic glands being involved. The prognosis is bad. The treatment simply means relief of pain—morphine and chloroform *ad lib.*

What has been said of carcinoma applies as well to sarcoma, save that the course is usually more rapid. Among cobalt-miners there has been found a form of pneumokoniosis attended in some cases with the development of slowly growing lymphosarcomas, with secondary growths in the lymphatic glands, liver, spleen and pleura.

## HYDATIDS

Primary pulmonary hydatids are exceedingly rare, secondary ones very rare. The symptoms are those of the original development, usually in the liver, with pain, cough, dyspnea, sometimes bloody sputa, and the physical evidences of the developing tumor. The characteristic booklets may be expectorated. The cysts may discharge through the bronchi or the serous sacs, or externally, causing inflammation in their path. It is a dangerous affection.

The treatment is surgical.

## CHRONIC PHTHISIS

The causes are those of the acute form. The infection is less virulent, or the body forces more powerful, and the malady drags along for years.

**Pathology:**—The upper lobe is usually first affected near the apex, the lower lobe next, then the upper lobe of the other lung. The left side is primarily affected somewhat more frequently than the right.

The primary lesion is tuberculous infiltration, beginning in the air-cells or bronchioles, which are soon obstructed by debris; caseation follows, then softening, liquefaction forming cavities, increasing by ulceration; or calcification may ensue, or fibrosis. Extinct tubercle may be surrounded by zones of compensatory emphysema, or of cirrhotic tissue.

Tubercular nodules in the bronchial mucosa may break down and the resulting ulcers become infected by pyogenic bacteria and spread. The same process occurs in the cavities formed by softening, when open to the air. In slowly progressive cases, or when tubercular infection follows thoracic disease causing loss of lung-substance, bronchiectasis may occur, and the cavities may increase



by ulceration, their walls breaking down under the influence of septic matter collecting in them. Gradually enlarging the cavities communicate, the septa breaking down, sometimes forming large compound cavities, in which large masses of sputa collect and decompose. The effect of such matter coming in contact with the healthy lung and bronchial tissues adds much to the distress and increases the area of the disease.

The walls of freshly formed cavities are soft and necrotic, those of older cavities are lined with a pyogenic membrane, later becoming exfoliative. Bronchiectases may present smooth walls. Large cavities may be traversed by fibrous cords formed of obliterated arteries. Arteries still pervious are studded with aneurismal dilations, often the source of hemorrhages. The most common seat of cavities is the upper lobe. Small cavities may become obliterated by the contraction of the fibrous capsules. In this capsule tubercle bacilli may penetrate, and their destructive work enlarge the cavity, or fibrosis may extend into the surrounding zone of lung-tissue, thickening the protective wall at the expense of the pulmonary parenchyma. It is to this process that the dullness on percussion is mainly due, not to tubercle, which only occasions dullness when in large nodules. Hence, dullness in chronic phthisis is usually a good prognostic. Disseminated miliary tubercles do not cause dullness, and their effects are more rapidly fatal than those of isolated nodules, even if large. The miliary tubercle, with its zone of fibrosis or caseation and compensating emphysema, when multiplied countlessly, disables a large proportion of the pulmonary tissue. The process is similar, occurring in many small spots instead of one large one. Miliary tubercles are usually deposited also in the pleura, bronchial glands, larynx, and other organs.

**Symptoms:**—The affection comes on gradually from a condition of debility, in convalescence or exhaustion. There is evident a decline in strength, loss of weight, anorexia, inability to digest foods previously agreeable, with slight hacking cough of which the patient may not be conscious. Some fever becomes apparent towards evening, perhaps with bright eyes, flushed cheeks and unusual brilliance in conversation. When at last the patient consults the physician, self-prescribed treatment proving futile, there may be found a few very fine rales, heard at the end of forced inspiration, over a limited area of one lung, in the clavicular spaces in front, or more frequently in the space uncovered by the angle of the scapula when the shoulders are drawn forward. Only a slight local catarrh; but a localized catarrh in the upper lobe of one lung is ominous! There is value in the popular saying that a cough is dangerous inversely to its strength.



In other cases the attack opens with pleurisy, marked indigestion, peritonitis or laryngitis. More acute cases begin like pneumonia, with regular periodic chills, or with bronchial hemorrhage.

The course of the malady is so varied that an analysis of the symptoms will give a better idea of it than an attempt at detailed description.

Pain may be due to pleurisy, straining of the diaphragm by severe coughing, aching preceding hemorrhage, or pleurodynia accompanying phthisis but not due to intercostal tuberculosis. Aching between the scapulæ is of diagnostic value.

The cough is at first slight, later varies with the course of the disease, irritative especially if the larynx is affected or when decomposed secretions flow into healthy bronchi. Cough on rising, and later on lying down, is characteristic. Coming at meals it may cause vomiting.

There is little or no sputum at first, then it becomes gray and sticky, afterwards is yellow or green, as pus forms, bloody when ulceration is active. The continuance of gray sputa when a bronchitic discharge would have become yellow is significant. The sputa from cavities have been described. The sputa mainly consist of mucus from the bronchi, and contain tubercle bacilli and other microorganisms, pus, blood, elastic fibers when lung-tissue is breaking down, fat, food-particles, and substances inhaled.

To examine for tubercle bacilli select a grayish bit, spread evenly over a cover-glass previously sterilized by holding in the flame of a spirit lamp; dry over the lamp, and fix by passing through the flame, stain with carbol fuchsin, decolorize with nitric acid, wash and stain with methylene blue. Viewed with a 1-12 oil immersion lens and Abbe condenser the tubercle bacilli appear as red rods in a blue field. Many and repeated examinations are necessary before one can say there are no tubercle bacilli in the sputa, for failure to find them on one slide does not prove there are none in the whole quantity. In collecting sputa for examination let the patient eject that collected in the throat and save what he brings up "from the bottom of the lungs," after full deep coughing.

To find elastic fibers, the sputa should be boiled in a solution of caustic soda, one part to thirty-two of water, and allowed to settle in a conical beaker-glass. The lowest drop can be taken up by a pipette and placed on the slide. Fibers from the air-cells are interlaced, those from blood-vessels or bronchi are long and parallel. Some are branching. They are relics of broken-down lung-tissue; the cause of the destruction is gathered from the symptoms.

We have already discussed the relations of bronchial hemorrhages, which may indicate the presence of tuberculosis or may be the cause of

it by preparing a suitable soil through the influence of the decomposed blood on the pulmonary tissues. Profuse hemorrhage occurring late in the course of phthisis or when ulceration is progressing rapidly, indicates erosion of an artery. Smaller hemorrhages are not uncommon and are usually beneficial, the patient feeling relieved, the fever and cough subsiding. Blood-spitting, small quantities of blood in streaks, is very common and does not necessarily indicate tuberculosis. Pneumonic or stained sputa occur from capillary oozing. Change of residence to the sea-shore, or to an elevation 5000 feet or more above the previous habitation, is apt to be followed by a hemorrhage. The phthisical patient is liable to engorgement of the lungs and consequent hemorrhages, from emotion, over-eating or drinking, exposure to cold, and from unknown conditions. A sense of vascular fullness, thoracic stuffiness, with pain most frequently referred to the second right intercostal space near the sternum, and irritative cough, often precede the hemorrhage for one or several days.

Dyspnea is conspicuously slight, considering the degree to which the respiratory tissues are inhibited or destroyed. Respiration is accelerated, however, and in proportion to the fever and the tissue-destruction. Unusual exertion quickly demonstrates the absence of a pulmonary reserve.

Inspection shows the thorax flat above, intercostal spaces wide, clavicular spaces sunken, lower part of sternum depressed, scapulae wing-like, the angle of Louis prominent. The "paralytic" thorax may precede or follow the development of phthisis. Emaciation is usual, the skin soft, elastic, greasy, sometimes emitting a catarrhal odor. Expansion is defective over the diseased area, best ascertained by palpation. Tactile fremitus is increased early. Forced expansion is less than two and one-half inches, unless the patient has trained for this test.

Dullness on percussion is evident in the clavicular spaces, when the lung below is consolidated. This is mainly due to fibrosis. Dullness in other parts of the lung may indicate large tubercular nodules or circumscribed pleuritic exudations.

The first note of danger may be a fine crepitation heard at the apex, or under the posterior angle of the scapula, confined to a limited area, heard at the end of a forced inspiration. Prolonged expiration is an early sign, and inspiration broken into "steps." Sharpened vesicular breathing is followed by bronchovesicular and this by bronchial. During the progress of the malady every form of rale known may be heard, crepitant, subcrepitant, mucous, submucous, sibilant, sonorous, rhonchus, egophony, pectoriloquy, etc., as well as every form of pleuritic sound.



Cavities cause marked retraction and loss of motion, increased tactile fremitus if empty, less sound-conduction if full, dullness on percussion if full of secretion, tympany if large and full of air. The note is louder and higher pitched if the mouth is wide open (Wintrich's sign). The tympanitic note may change pitch with change of posture (Gerhard's change of sound). The "cracked-pot" sound may be heard over large cavities with thin walls.

Auscultation over small, lax-walled cavities shows cavernous, low-pitched breathing; over large tense-walled ones there is amphoric, high-pitched respiration. Moist rales depend on the contents, and are developed or altered by coughing. Large cavities with smooth walls give "metallic tinkling." Pectoriloquy and amphoric whispers are heard over the largest cavities.

Fever is present from the first and its height indicates fairly the activity and extent of the disease process. Chronic forms with slight or no tubercular infection show fever towards night and a normal temperature in the morning. Very high fever with hectic and night-sweats, or chills, indicates streptococcus invasion. Cessation of fever indicates quiescence of the malady, and if continuous, a cure. Sometimes chills occur so regularly as to induce the diagnosis of (quotidian) ague. Night-sweats follow fever of 104 or more, and are especially marked during destructive or septic stages. Wasting is also to be credited to the fever, being rapid in acute forms and becoming extreme in subacute. During apyretic intervals the patient may fatten considerably. Anemia comes from the fever and the impairment of nutrition. The blood may be normal or deficient in hemoglobin. Leucocytosis occurs only in septic, suppurative states. Debility is progressive.

Among concomitant phenomena may be mentioned tricuspid valvular disease, thrush, gastritis, early hyperacidity, later subacidity. Hectic sweats may alternate with bronchorrhea or colliquative diarrhea. Intestinal tuberculosis may result from swallowing sputa. The appetite is feeble, capricious, the digestive power small. Anal fistula is not common. Albuminuria is common, and nephritis may eventuate, amyloid or desquamative. Pyelitis or cystitis may occur from secondary tubercular infections. The face is pale, cyanotic sometimes in the later stages, the skin dry and harsh with chloasma on the chest, or pityriasis versicolor, the hair extraordinarily luxuriant, the nails soft or brittle, the finger-ends clubbed.

The patient is singularly buoyant. The fever stimulates his mental faculties to unhealthy brilliancy. To the last he has a conviction that his malady is not "true consumption," and that he is going to recover.



**Diagnosis:**—The aspect of the patient, his family history, occupation, habitation, the physical signs of localized pulmonary disease in one apex, slight cough, fever, wasting, hectic, hemoptysis, brilliancy in evenings and night-sweats are all ominous; but in these modern days the diagnosis is made solely by the microscope. The X-ray is of value only in advanced stages. The rise of temperature following the hypodermic injection of tuberculin is highly significant.

#### PYOPNEUMOTHORAX

History of pleurisy,  
Interspaces motionless and bulging,  
Apex beat displaced,  
Vocal fremitus less,  
Percussion note full and deep,  
Outline of dullness follows change of posture,  
Vesicular sounds and vocal resonance absent,  
Amphoric sound if air passes opening,  
Coin sound and succussion splash.

#### LARGE PULMONARY CAVITY

Immobile, flat chest, spaces depressed,  
Apex beat normal,  
More fremitus,  
Tympanic or cracked pot,  
Wintrich's change of sounds,  
Vesicular sounds and vocal resonance present,  
Bronchial sound increased,  
Crackling, gurgling, cavernous or amphoric sounds,  
Pectoriloquy,  
No bell-tympany or splash.

**Prognosis:**—Bad indications are the acuteness of the attack, rapidity of its progress, deficient resisting power of the patient, high and persistent fever, hectic, night-sweats, the presence of many tubercle bacilli and streptococci in the sputa, softening and cavity formation, complications, inability to take and utilize needed food, disposition to substitute alcohol for food, age below or at puberty, bad hygienic environment and poverty.

Death may occur from intercurrent disease, nephritis with hydremia, endocarditis, hemorrhage, angina pectoris, but usually is due to exhaustion. The course is most varied; one patient died in four days, while many survive for many years. Anders gives the average as three years.

**Liability:**—The liability to tuberculosis is universal.

We have known the strongest men, living the healthy life of farmers, without an instance of the disease in their ancestry as known for several generations, to become tuberculous within a year from the day they married consumptive wives. Nevertheless the predisposition to the

disease varies, and some are more liable to contract it than others. This is not always a question of strength, as the strongest of men may succumb to the attack of the bacillus when weaker men escape. When a student in Cleveland, one of our classmates, Lee Heavner of West Virginia, a great powerful man, of faultless habits, without preliminary ailment, was seized with tubercular phthisis and succumbed within the year. None of his classmates, exposed to the same influences, occupying the same room, was affected. His family was well known to be consumptive. In this case the evidence seemed to be conclusive that there was a hereditary predisposition and not an infection through residence in an infected house, for the man was not living at home when the disease attacked him.

In many other cases the alleged inheritance is really a contagion, the patient being attacked while occupying the house, room or bed, in which a tuberculous person is or has been. Flick has accumulated much evidence showing that tuberculosis haunts certain houses, attacking successive families dwelling therein. If a consumptive emits billions of tubercle bacilli each twenty-four hours, it is easy to see how a house becomes affected.

The liability to tuberculosis is greater in the children of consumptives, in scrofulous children, in those who are liable to epistaxis during childhood, in those who are debilitated through disease and faulty hygienic environment, the rickety, cyanotic, etc. The liability is also increased by the occurrence of typhoid fever, measles, whooping-cough, and any other form of pneumonia.

Contagion is favored by crowding together numerous persons, in badly ventilated places such as asylums, jails, factories, and sweat-shops, especially when poor feeding and depressing influences are at work. The milk and flesh of tuberculous cattle carry bacilli, and domestic animals are frequently to be blamed with the infection of their owners.

In the great majority of cases the attack may be credited to the inhalation of the bacilli given off with the sputa of consumptives. Less frequently the other excreta are the source of infection. While the bacilli live for an unknown period outside the body, the influences fatal to them probably balance their reproduction, since the proportion of the human race that becomes tuberculous does not perceptibly increase. It is therefore evident that if care were taken to destroy all the excreta of all tuberculous patients an end would be put to the affection in time.

**Treatment:**—Consumptives should use a portable cuspidor. The sputa should be burnt; chemical disinfectants are less certain. The feces and urine should be passed into a vessel containing freshly made whitewash,

and allowed to stand an hour before emptying. When the patient vacates his apartments, by death or otherwise, the disinfection should be as thorough as possible, the most satisfactory method being to burn the house. For this reason it is advisable that such persons live in inexpensive houses, of wood or of corrugated iron, with the simplest of furniture.

No person should occupy the same bed as the consumptive, and the children of such patients should be taken to another residence if possible. They should be systematically hardened, by cold baths, salt rubbing and open-air life, carefully regulated exercise, scientific feeding and, in a word, all the resources of modern hygiene. Children predisposed to consumption are apt to be very "nice" about their eating. They should be taught systematically to discourage the eccentricities of taste, and to eat everything. Too often these peculiarities are encouraged by the mother, under the idea that they are evidences of some sort of superiority on the part of the child. The stomach is a creature of habit and may be trained to do its duty as readily as the child itself. Especially should they be taught to eat fats, which such children rarely do. At first the fat will cause indigestion, but by a few weeks' persistence this will be overcome and the fat will be relished. Similar persistence will subdue the dislike for nearly if not all foods at first not relished, and the net result will be a stomach that will digest anything its owner thinks best to put into it; a very desirable state of affairs.

There are three respects in which the choice of a climate influences the patient, whether he is already a consumptive or simply predisposed to that disease. First: All persons gain blood in an elevated locality, the blood becoming richer in red cells and in hemoglobin in high altitudes. We noticed with interest the brick-red complexions of all the inhabitants, especially the children, at Silver Plume, Colorado, over 9,000 feet above the sea-level.

Second:—All persons enjoy better health and resist the attack of disease better, as they spend more time in the open air. Those who are predisposed to tuberculosis and those who still feel capable of making a fight for their lives should arrange their affairs so as to keep in the open air as much as possible. There are advantages even in the noble profession of the tramp, possibly even in that of the book-agent. That climate is best for each patient in which he or she can spend the most time in the open air. This embraces the consideration of heat and cold, moisture and dryness, sunshine and shade, etc. An equable climate, without sudden changes or extreme heat or cold, with a maximum of sunny days, with a dry atmosphere and a free circulation of air, is usually preferred. A thickly-wooded country would be objection-



able because there would be little circulation and much dampness. Taken altogether, the western slopes of the Rocky Mountains offer the most generally suitable locations, the patient following them south into Mexico as the fall approaches, and north into Idaho as the summer advances.

Third: Individual preferences and peculiarities must be consulted. Broadly speaking, mankind is divided into two classes, the mountaineers and seamen. Some improve the moment they reach the mountains and languish at the seashore, while others, perhaps in the same family, find the seaside suits them and do badly in the elevated regions. Along the Atlantic coast there are many persons formerly consumptive who have found health there and have wisely made it their permanent home. Others are to be found in the Adirondacks, in Minnesota, Colorado, Southern California, Arizona, Texas, the Gulf Coast, Florida, the West Indies, Old Mexico, and every other locality that has as yet been exploited as a "cure" for consumption. And in every one of these places are the graves of unnumbered dead, who have been allured by the glowing reports of the first enthusiasts who, finding health there, jumped at the hasty conclusion that their experience would be that of all who followed them. Beyond the principles laid down above, there is absolutely no benefit to be obtained from any climate, and the selection must be made on personal grounds entirely. It has not as yet been shown that any climate is specifically curative, or that any atmosphere has in it any element fatal to the tubercle bacillus, or is deficient in any element necessary to its vitality.

The only rule deducible from our experience is that no person should be sent to any place that has acquired a reputation for the cure of consumption. The reasons are, the pollution of the air by the bacteria from the crowds of consumptives, the lack of proper accommodations from the same cause, and the depressing influence of seeing around one these fellow-sufferers, all animated by the hope of a cure, and most of them evidently deceiving themselves. For the marvelous hopefulness of the consumptive does not take in his consumptive neighbor; and when one sees the others equally hopeful and yet failing every day, the pessimistic thought is apt to intrude, that he also has been deceiving himself, and pessimism is a fatal symptom in a consumptive.

When the location has been selected, the patient must find some suitable occupation; and this is a matter of much importance. He ought to have a productive one, as he should be encouraged to look upon himself as a normal, self-supporting member of the community, and not as an invalid. Indeed, it is hard to say how

far this principle can be carried with advantage, as even advanced cases have responded favorably to it. By rule, the patient should keep quiet and in bed while the temperature is up, and do his exercising in the morning, when the fever is down. Fatigue is also to be avoided, as the tubercle bacilli more readily overcome the resistance of the body when it is exhausted by any cause. Fatigue is therefore apt to be followed by a development of the malady. The minute care that follows the patient about, checks him whenever he has had exercise enough, throws a shawl over him when heated or as the air grows cooler, keeps him in bed during the febrile period, and thus prevents taking cold, becoming fatigued and other possible causes of backsets, has its place especially with advanced cases, and that numerous class that has no sense of its own to exercise. Nevertheless, in this class we can but rarely look for a "cure." In the majority the result of our efforts is simply that prolongation of life and alleviation of its miseries that seem so much to the doctor and so little to the patient.

Though this method of management is theoretically correct, so strong is the influence of suggestion that some will improve by disregarding every precaution and deliberately forgetting that they are invalids. They go out every day, rain or shine, fever or no fever, persist in wandering over the mountains, eat all sorts of food with an out-door appetite, and by the force of will, of rousing the vital powers, and the influence of hope, they actually recover, the wounded lung cicatrizes, and they live out their allotted time. These are the exceptional cases. For one that is thus cured, twenty are killed by the same means. If the patient be of the timorous class that dreads death and wants to cling to every day that he may be kept alive, it is best to adopt the painstaking plan; and this is the only one for the advanced cases, for the weakly and indolent, and for those who are not likely to follow up the active plan with energy and intelligence. But for those brave souls that will only give up when life is extinct, who will die fighting if die they must, and will take any chance, small though it may be, rather than sit still and wait for death, the active plan is preferable.

The diet of the consumptive should be rich in nitrogenous articles, care being taken that they are completely digested. There is a certain antagonism between uricemia and consumption, and the meats that produce uric acid protect against the graver affection. Milk is most useful if from cows certainly not themselves infected. Eggs, fish, oysters, rare meats, with acid-pepsin to aid digestion, are of special value. But these are not to be used to the exclusion of other food.



The most infinite variety of foods gives better results than any limited diet.

The question of alcohol has been fought over for many years, but the view now held is that this agent does not in any manner aid the patient, while it favors the occurrence of fibrosis and the destruction of the pulmonary cells. Its interference with nutrition is beyond question, while it destroys the appetite, the patient tending to gradually substitute alcoholic beverages for food. We never use alcohol in the treatment of consumptives and rarely in any other affections.

The use of nuclein in tuberculosis is based on the following consideration: Leucocytosis, the multiplication of the white blood cells beyond the normal number, takes place in almost every disease of bacterial origin, with the exception of tuberculosis. All these other microbic affections are self-limiting, again excepting tuberculosis. Is there any connection between these two facts? Metschnikoff, in his celebrated observations on the phagocytic action of the white cells, concluded that these bodies played the part of an armed force, ready to combat any intruding microorganism. Buchner followed with the observation that the blood-serum exclusive of the cellular elements could destroy disease germs. Finally Vaughan announced that by the administration of nucleinic acid the number and activity of the leucocytes could be increased.

While the evidence is strong in favor of nuclein when given by the mouth, it seems wiser, in administering an agent whose action is so nearly if not altogether a vital one, to take no chances on its being destroyed by the gastric juice, but to give it by the more direct or hypodermic method; or dropped under the tongue.

This, with reconstructive tonics, preferably the arsenates of iron, quinine and strychnine, and saturation with the sulphides of arsenic and lime, is the only direct treatment we have to recommend. The various forms of tuberculin have all failed to establish their efficacy, and have less in their favor theoretically than nuclein. The reports from Trudeau indicate that no more is to be said on behalf of the various serums tested at his sanatorium. Many capable workers are running out the possibilities in these lines, and it may be that they will ultimately hit upon something of more practical utility; but at present this is still "in the air."

The endeavor to destroy the bacilli in the body by chemical germicides has resolved itself into the use of creosote and its derivatives, especially guaiacol. Out of many cases treated with these agents a few have been cured. These have been individuals who exhibited a remark-



able tolerance of the drug, and very large doses were given for long periods, until the patient was saturated with it. One woman thus treated smelt like a ham and her skin was the color of dried beef. Few stomachs can bear these large doses of creosote and guaiacol, but oleo-creosote, the carbonates of creosote and guaiacol and other derivatives have proved more agreeable. Whether they are as effective also we are not quite sure; but we have obtained excellent results from them in some cases, pushing the doses up to the limit of toleration; for if benefit is to be expected from a germicide it should be given to bring the body under its influence as quickly as possible, to attain such a degree of saturation as will render it impossible for the bacillus to live in it.

The most potent agents we have yet found are the sulphocarbolates. The discovery of their usefulness was accidental. We had reason to fear that by swallowing sputa a patient would infect his intestinal canal, and to prevent this we gave him zinc sulphocarbolate, which we had long used as an intestinal antiseptic. With the disappearance of odor from the stools the fever dropped, the appetite and digestion improved, and the general improvement followed that is seen in other cases of febrile disease when intestinal antiseptics has been produced. For three years this patient has taken the sulphocarbolate of lime, forty grains a day, and in that time she has never missed a meal or had an indigestion. The calcium salt was chosen because the fragility of her tissues demanded lime, and it agreed with her stomach. We have since made the sulphocarbolates a standard prescription in all cases of consumption, and have been abundantly satisfied with the results.

Iodoform is a remedy that has been recommended by many clinicians, on different grounds. It is, in part at least, eliminated by the lungs, favorably affecting the cough, stimulating the absorbents, and possibly acting in some degree as an obstacle to the multiplication or to the activity of the bacilli. There is an unusual tolerance of this agent in consumption, and we have given five to twelve grains daily for months without the production of iodism.

Many observers have noted the virtues of strychnine as a general tonic, improving the appetite and digestion, checking the fever and the night-sweats, as well as the tendency to colliquative discharges by the skin or the bowels, etc. We have found it decidedly advantageous to give strychnine arsenate, gr. 1-30, three to seven times daily.

Fever is not so much due to the direct effects of the bacilli as to the absorption of septic products. It is necessary therefore to keep the purulent matter cleared away as thoroughly as possible. The pulmonary tract may be cleared out by inhaling the fumes of boiling vinegar for

five minutes or more every night just before retiring. This removes the collected secretions, and the patient has relief from the cough for some hours, perhaps until the next morning. Advantage may be taken of this to try to reach the affected tissues with local remedies applied by the atomizer. We usually employ an oil atomizer charged with a mixture of eucalypti in fluid petrolatum, one part to eight, and spray with this for five minutes. Some few patients find great relief from inhaling the fumes of burning sulphur, and this should be of great value as a germicide, but most persons are unable to bear even a slight inhalation of this irritant gas.

The foregoing treatment, aimed at its cause, generally reduces the fever to a safe point; so that direct treatment of this symptom is not often required. In case an antipyretic is needed, however, from five to ten drops of guaiacol may be rubbed into the skin, in the clavicular region. This produces so decided a fall of temperature that some caution should be exercised in its application. Or, five grains each of guaiacol and piperazin may be given in capsule every four hours. The reduction of the temperature in this manner is more decided and lasts longer than when Niemeyer's pill, quinine alone or any of the synthetic antipyretic of the anilin series are given.

The cough may be treated on general principles, giving codeine, the cyanide of zinc, cannabis, or steam inhalations to soothe irritation; emetine or lobelin to stimulate secretion; sanguinarine to arouse sensibility and cause retained secretions to be ejected; atropine or aspidospermine to allay dyspnea; strychnine and cubebin to restrain excessive secretion, etc. The uses and causes of a cough should not be forgotten.

Indigestion, diarrhea, etc., cease to be prominent symptoms of consumption when the general treatment advised is employed.

And with all this done, what is the net result? What hopes can we hold out to our patient? Will he in spite of it all simply delay his steps awhile, and then rejoin that innumerable caravan that is steadily marching along the road to the consumptive's grave?

We are entirely too gloomy in our prognoses of consumptives. Whitaker says that it is shown by the records of many thousands of autopsies that two-thirds of the human race suffer at some period of their lives with tuberculosis, and that one-half of these examinations show that the disease has been cured. This gives a general mortality of fifty per cent. Admitting the correctness of the gentleman's figures, it is difficult to get away from his conclusions.

We can now look back over a period of thirty-five years spent in the study and practice of medicine. We have attended many a consump-



tive to the grave. But throughout our professional life we have seen cures; at first not admitted, as the conviction was so strong that the disease was incurable, that the diagnosis was denied if the patient recovered. This, of course, effectually "jugulated" all the chances of establishing a successful method of treatment. But since the discovery of the bacillus, easily determined by the use of reagents and the microscope, we can proceed on the basis of certainty as to diagnosis, and maintain our claims of success. And this enables us to assert that our earliest claims were well founded, and that consumption has indeed been cured many times when the doctor allowed himself to be "bluffed" out of the results of his labors.

It is also evident from this retrospect that there has been a progressive improvement in the results, as the methods and the skill of the doctor improved with experience. Cures have been more frequent, and the average life of those who were not cured has been longer. And since everyone must expect to die sometime, the importance of this latter statement is greater than at first sight seems obvious. Let it be understood that in each case the prime object is not so much to kill a swarm of invading microorganisms, or to restore a diseased organ to an impossible condition of perfection, a return to the *statu quo ante bellum*, as it is to best utilize and promote the patient's remainder of vitality, to extend his life and capacity to work and enjoy to their utmost possibility. If this be fully comprehended by the doctor and his patient, the problem assumes a somewhat different aspect. Many a valuable life has been wasted in the vain attempt to win an utterly impossible "cure," when under proper management the patient might have lived to the full limit of his expectancy.

How to live the best and longest with tuberculosis is often our study. In this is involved the proper care and treatment of all classes of cases, from those that can be entirely and permanently cured to those who go down rapidly to the grave.

From the treatment outlined in this paper the writer has had better success than from any method previously employed. The improvement in some cases is almost past belief. In some, the bacilli in the sputa grow scarcer at each successive examination and finally disappear; the symptoms showing a corresponding course. In others the bacilli decrease until very few remain, but these few persist obstinately. No case in three years submitted to this method has failed to improve very much. Cases of mixed infection have received in addition such treatment as was indicated.



## CAMP AND SANATORIUM TREATMENT OF CHRONIC PULMONARY MALADIES

It has been shown conclusively that exposure to sunlight is destructive to tubercle bacilli, while it increases the vital resistance of the patient. Denison says that when cattle are confined to stables they become tuberculous, but when taken from their stalls and sent out to graze on the open prairie they gradually recover, so that tuberculosis becomes extinct on the ranges.

Local tuberculosis of the skin has been treated by exposure to the actinic rays with some success. The effect has been attributed to the germicidal action of the chemical rays, just beyond the violet, to the increased supply of blood thus attracted to the skin, and to the effect of the light upon the blood. In the laboratories, light must be excluded or the cultures are lost. It is obvious, therefore, that the climate best suited for consumptives is that where they can enjoy the most sunshine.

Kime very rationally contends that to secure the benefits of sunlight the patient's body should be exposed to it, and not merely his clothes. He has demonstrated that when concentrated the actinic rays pass entirely through the human body, with sufficient intensity to reproduce a picture on a photographic dry plate. The skin offered most resistance, the muscles less and the bones the least. By using blue light a large percentage of the actinic force is utilized, with little of the heat, which is strongest in the red rays. Kime is in doubt as to whether the rays kill the tubercle bacillus directly or simply by stimulating phagocytosis; but in skin tuberculosis he is positive as to the curative action, the malignant ulcer being converted into a simple one. In one of his cases three treatments of ten minutes each, with a blue lens near the cautery point, effected a cure within three weeks.

Abrams reported cures of tuberculous lymphatic glands by this agent. Whether the method will prove as successful in the treatment of pulmonary tuberculosis remains to be seen; though the early reports are encouraging. The question is most important, as, if the advantages of climatotherapy can be thus secured at any place, its benefits may be extended to the enormous majority who cannot leave their homes.

The value of a residence in elevated regions lies partly in breathing the rarefied air. This stimulates the respiratory apparatus and develops it, so that mountaineers are noted for the fine development of their chests. This is imitated in the pneumatic cabinet, which the patient enters and the air is rarefied by an exhaust pump. This is said to be a very effective remedy for pulmonary hemorrhages, but at the best it is but a paltry substitute for the mountaineer's life, with its sunlight, pure, cool air,

exercise in climbing, with the consequent appetite and digestion. An hour or two spent in the cabinet is of benefit, but living on the mountain for 24 hours of each day is that much better.

The cabinet permits the use of medicated inhalations but these are managed easily without it. In the cases where we have employed the fumes of burning sulphur we have been surprised at the ease with which patients withstood them. Personally the smallest trace of the fumes in the air will set up the most violent coughing, which will last long after leaving the room; but some tuberculous patients breathe with comfort, and absolutely with liking, air thick with the gas. The inhalations generally give marked relief, and the symptoms are ameliorated, sometimes for weeks or months afterwards.

The great value of Finsen's light-cure lies in the patient's being treated at his home, where he is under the doctor's watchful care. In the vast majority of cases this is the first essential. Few men or women know how to live hygienically. Still fewer do it, even when healthy. In chronic disease of the lungs the regulation of the life is everything. Fatigue seems always to be followed by a renewal of the malady, as if the little enemies were ever ready to seize a favorable opportunity to renew their attacks. A lazy indoor life saps the vitality also; so that to steer between the two difficulties, securing the maximum benefit of outdoor exercise and avoiding fatigue, requires a nicety of judgment rarely seen outside of the medical profession and not too often within its ranks.

Then again, few consumptives know how to vary their clothing with the changing weather, how to get the greatest benefit from their food without overtaxing the digestive organs, how to train the stomach properly; in a word how to give their personal habits that minute and intelligent care they demand, and yet not become hypochondriacs or valetudinarians. Is it not all summed up by saying that the consumptive must have a doctor to do the thinking for him, in so far as his malady is concerned?

We have said that the best climate is that which affords the largest proportion of sunshine. Add to this the benefit of mountain air, and we will find what we seek in the elevated regions of the Rocky Mountains, along their entire extent. In summer the patient can go north, and ascend higher to secure coolness; in winter he must go south, or descend to the foot-hills. In Northern New Mexico, at Aztec, on Las Animas river, some consumptives have regained health. This tableland is about 6000 feet above the sea; it is cooled in summer by the breezes from snow-clad mountains and protected by them from excessive wind. The winters are mild, with but little frost, so that with the aid of an



oil-stove patients can live in tents the whole year. The soil is sandy, drainage good, water alkaline. Fruits of all kinds flourish on the soil watered by irrigation (by private ditches, not by corporations). The air is dry, the sandy plains extracting the moisture. No great rush has yet occurred to this region, so that it is as yet unpolluted.

Arizona is well suited for winter residence, but too hot for summer. Along the mountains thence down into old Mexico can be found many ideal localities, for those able to care for themselves and secure their own food. Those able to hunt can find game in abundance, but outside the States they need not expect hotels or American food. For those who can endure and enjoy the life of the hunter and prospector, health is to be found in these regions.

For the delicate, women and advanced cases, it is wiser to go where the comforts of civilized life can be procured. Florida, our new island possessions in the West Indies, Cuba and the Lesser Antilles, offer many eligible locations, where the patient may enjoy life, obtain its luxuries, accomplish a cure when still possible, and prolong life and its enjoyment to the greatest extent when a cure cannot be secured. In other words, a residence here is pleasant, and offers the best chances for a cure to those not calculated for the rough life of a hunter.

We know of no work so well suited as a guide-book than the one written by our old friend W. F. Hutchinson, under the title of "Under the Southern Cross." Dr. Hutchinson for many years spent the winters in the West Indies, Central or South America, and gave in this book exactly the information one wants—where, when and how to go, hotels, prices, pleasures, dangers, how to dress, etc. The book was published by Appletons.

Porto Rico deserves especial attention. Its hills should prove especially suitable for the winter homes of invalids. Probably many openings for the profitable employment of convalescents with some capital will be found there.

Robert Louis Stevenson sought health in the islands of the South Pacific, and found there a grave. Nevertheless, he undoubtedly lived longer and more comfortably than if he had remained in the North. The climate of the Philippines is hot and damp, and under such influences the disease progresses rapidly, the bacteria multiplying fast. But there are many islands where eternal spring reigns, and if one can bear the isolation the conditions are most favorable to a cure. But—one young man we sent there returned; and when we asked him if he knew he came back to die, he said, "yes, but I would rather die in God's country than live there,"



Some persons care more for life than for human society, but this matter should be considered carefully before advising. If the patient, forewarned chooses life, let him be sent to seek out a suitable place, and when there adopt the native costume of a bracelet or two, and let the sun exert its full power. To some of us who have had fifty years of not overly pleasant experience with humanity, a Crusoe-like life on an ocean island, with a shipload of books and other necessities, would not seem so undesirable.

In prescribing a camp life several important objections are advanced by Von Ruck, such as the difficulty of obtaining a constant supply of fresh meats, milk, cream, butter and other stores, and preserving them, keeping the camp in a sanitary state; taking colds; care for acute attacks; shifting location with the season; to which may be added the questions of accessibility, aid in case of need, and the intrusion of hostile or curious visitors. In truth, camp life suits but a limited class. Even so, the time required for a cure is long, by no means limited to a few months; and when one has been cured there will be found an increased liability to relapse, when the whilom patient returns to the germ-laden air of civilization. He has lost his immunization by breathing pure air.

Brooks enumerates the following essentials for sanatoria designed for consumptives:

1. There should be a good southern exposure.
2. The soil should be well drained and preferably of gravel. It is, of course, essential that the foundations should be dry.
3. There must be free access of sunlight.
4. The "camp" for the *Liege und Dauerluftkur*" should be situated in the open, but protected from the north and east winds. Glass covers to the verandas are not necessary.
5. There should be facilities for walking, preferably through the woods, and if possible up a slight incline from the sanatorium, so that the homeward journey may be down hill. There should be facilities for resting at easy distances.
6. The diet should be most carefully regulated. Feeding should be slightly in excess, but the food should be well selected, nutritious, temptingly served and, of course, properly cooked.
7. There should be large, airy, individual sleeping apartments, affording free admission of sunlight.
8. Every patient must be provided with an individual spitting-cup, and forbidden upon pain of immediate dismissal to spit anywhere else.
9. There should be withal scrupulous cleanliness, adequate service and regular disinfection. The furniture should be somewhat severe.

Carpets, brooms and hangings have no place in a well organized sanatorium. Cloths, dampened with antiseptics, should be substituted for dusting.

10. There should be a routine of occupation, together with simple diversions, to prevent introspection.

Much, very much, could be said in favor of the sanatorium for consumptives. The constant supervision, the watchfulness over the development of the malady and prompt application of suitable remedies, all by one skilled in the management of these cases by daily association with the patients, all this is of incalculable value.

All that can be urged against the sanatorium may be embraced under the single head of mismanagement. If the destruction of sputa, the daily fumigation of the living rooms, and the other measures to prevent the infection of the premises and reinfection of patients, are not carried out perfectly, the sanatorium is about the most dangerous place the consumptive could find. A patient once informed us that every morning the servants in a popular "sanatorium" could be seen mopping up the sputa from the halls, corridors and public rooms!

But with proper management such an institution offers the very best chances for the cure of the consumptive, and we believe the per cent of cures there largely exceeds that obtained by the camp method. Under the use of the treatment herein advised the bacilli in the sputa become fewer until they disappear, the symptoms and general condition of the patient showing corresponding improvement. Keep him in the sanatorium until this has been accomplished, and he has been taught thoroughly the lesson of how to care for himself; then send him to the camp.

What after all do we mean when we speak of a cure for consumption? The bacilli may disappear, the cavity scar and contract, the disease become obsolete. But the bacillus always lurks for an opportunity to reinfect his victim; the predisposition that originally determined the attack remains; the congenital vulnerability of the tissues has not lessened. Hence the patient who has been cured of phthisis still remains more liable to a fresh attack than the person who has never suffered from the malady; more, even yet, when he sojourns in a bacteria-free atmosphere he loses the degree of immunity he has enjoyed while constantly exposed to the action of the bacilli, and when he returns to the inhalation of air thickly inhabited by them, they find his leucocytes unprepared to resist their onslaught. Hence the cured consumptive, who wants first of all to continue living, should find an open-air life that he is content to adopt for the remainder of his days, and henceforth eschew the "busy haunts of men." There must be no hankering for



the flesh-pots of civilization; he must be a solitary wanderer on the face of the earth the rest of his days.

#### MANAGEMENT OF THE PREDISPOSED

One of the most serious problems before the physician is the care of persons not yet consumptive but predisposed to become so. These are the weakly children born of consumptives; of parents weakly, drunkards, greatly differing in age; in families where the new baby comes regularly every year or less. The children are frail, teething late and badly, walking late, the sclerotics blue, the skin thin and transparent, the veins showing through, under-sized, precocious in studies and too weakly to take part in the rougher games of their companions, subject to epistaxis and gastrointestinal attacks. The skin sometimes has a soft, greasy feel, and emits a catarrhal odor. The eyelids may be eczematous. The chest is flat, the lung-power below the average.

Some of these children suddenly shoot up to unusual height, but this only emphasizes the defective chest-capacity. They are usually very nice about eating, liking few things, avoiding fat and coarse vegetables. Some, however, are gross, the face pimply, the neck seamed with the scars of glandular suppuration, the habits gluttonous, with indigestion, biliousness, and uricemia habitually

Very rarely the florid type develops, with a complexion whose rich olive and high color has a brilliancy that is wonderful. These people generally get the reputation of using cosmetics, or "eating arsenic," to explain the unnatural beauty of the skin. One remarkable case of this variety died of Pott's disease; two others are married, mothers, and seem to have safely passed the dangerous period. All were girls. We have never seen or heard of a male case of this description.

We have always looked upon the essential point of this predisposition to phthisis as being a deficiency of lime, the element to which the cells of the body owe their strength. If the lime is deficient the cells are fragile, they break down easily, the skin breaks on slight irritation or exposure to cold or wet; the bones ossify slowly, the teeth are slow in erupting and decay soon.

It has been noted that consumptives rarely have good teeth. We have also noted that never once in over 35 years' practice have we seen a case of cervical adenitis in a person with sound teeth; so that we have learned to look on the decaying teeth as an open door of which tubercle bacilli often avail themselves. The tonsils form another open door; and in their crypts may be found the original site of many a tubercular invasion.



The deficiency of lime is not due to its scarcity in the food or drink, for this element is often in excess in hard waters, and is present in every ordinary meal in sufficient proportion for the bodily needs. The difficulty is in its assimilation. This may be partly remedied by giving an excess of lime with the food, or by giving this element in the most manageable form. Experience has shown that while a large proportion of fat, lime, iron, etc., passes through the alimentary canal and is ejected in the feces, the larger the quantity swallowed, the more will be absorbed. If, for instance, one grain of iron be given daily, but one-tenth of a grain may be absorbed, but if ten grains be given one-tenth of this, or one grain, will be taken up.

So with lime. Give a superabundance of it, preferably as lactophosphate, the form experience has shown to be most easily dissolved in the body-fluids. Let the child be taught to suck soft bones of young animals, and chew off as much of them as possible. Powdered bone would doubtless also be useful if it could be procured at a reasonable price. Marrow on toast or in soup is usually relished by any one. More lime will be absorbed if given in numerous small doses than in a few large ones. A granule of calcium lactophosphate, gr. 1-6 every half-hour, does more good than gr. 5 thrice daily.

We have many times noted the good effect on such delicate infants of daily inunctions with oil. It seems reasonable that a thin animal oil will be more readily taken up by the skin and utilized than a thick or vegetable grease; so that cod-liver oil, lard oil or goose-grease, is usually recommended. They may be rendered inodorous by adding a little eucalyptol or any volatile oil. The inunctions should be kept up throughout the winters, and as long as the child appears to require them. For older patients a woolen undershirt may be saturated with the oil and covered with oiled silk to protect the outer clothes.

Even more important is the regime by which the child is strengthened, its power of assimilating the food-elements increased, and the tissues rendered more resistant to morbid influences. The diet should be carefully regulated to the needs, and the child taught to eat all varieties of wholesome food. Dislikes are soon overcome by having the child eat *one very small morsel* of any food it dislikes, or that it does not digest readily, at every meal. Especially should it be thus trained to eat fats of every description. A well-trained stomach is the most secure form of life-insurance.

Hot salt baths keep the skin in good order, and bring the blood to the surface for aeration. These may be gradually replaced by dry rubbings, with towels dipped into brine and dried, and in midsummer the

cold bath may be begun. This should be looked upon as strictly a therapeutic measure, not a means of purification. The ideal cold bath is a quick plunge, shower or douche, of momentary duration, a quick in-and-out-again, followed by brisk rubbing or slapping to bring about strong reaction. If commenced in midsummer the baths may safely be continued the year round.

The effect is to increase oxygenation, stimulate a more active circulation, put the skin in a healthy condition, and by accustoming it to cold render the patient less susceptible to catching cold. The sense of strength and well-being following the cold plunge stimulates the child to greater physical activity, and arouses the desire for free out-door sport. Moreover the moral effect is by no means unimportant. No child at first can look on the prospect of a cold plunge without shrinking; and the necessary nerving one's self up to do a disagreeable thing because it is a right thing to do, is a lesson that cannot be learned too early in life.

The love of out-door sports and occupations should be sedulously cultivated, and yet over-exertion as sedulously avoided.

It does seem as if a most useful innovation in our school system would be the making of domestic and personal hygiene a leading study, with practical demonstrations, and such exercises as would compel the pupil to really comprehend its meaning, instead of a perfunctory topic slurred over once a week, hastily, that the pupil may get back to the "classic" topics; the real value of which in the adult life is incomparably smaller. We would have every pupil compelled to measure the air-space of every living room in his home, and calculate its capacity for those dwelling therein, with the average consumption of oxygen by firelight and respiration; the ventilation; test the drinking water; examine the dust microscopically and bacteriologically; examine the food chemically and microscopically—in a word we would make him comprehend hygiene, even if he never learned to expand the binomial or even to enumerate the Kings of England.

Gymnastic training is of value, to expand the chest and develop the body symmetrically; but here also good sense must rule. Compare on the one hand the consumptive pugilist Needham, the only man who ever won a decision in the ring against Tom Sayers, and the fact that so many trained athletes die consumptives. Needham, by carefully developing his powers to their utmost healthy limit, accomplished his object. Many athletes, by attempting to develop themselves beyond their natural powers fall victims to the bacillus, to which the exhaustion of over-training offers a most excellent opportunity.



The selection of an occupation should be made with the advice of the physician. We are too well aware of the execration that one would incur, by advising any one to increase the number of book-agents or peripatetic dealers in anything, but really the life is nearly an ideal one for our *ci-devant* predisposed-to-consumption, who yet is not prepared to take to the hunter's or prospector's life. In the millennium the noble profession of the tramp may become respectable; or perhaps a really useful form of tramping may be devised, as of a youth we once knew who regained health as a peripatetic varnisher. There are many such things that would make a workman welcome at the farm-house.

Space forbids a detailed description of the useful gymnastic methods, but a few words must be said of respiratory exercise. Indian club swinging develops the chest-muscles admirably, and has the great advantage that the patient can have the clubs ready for a five-minute swinging at any hour, and many times a day. Always stop short of fatigue, and use the clubs for short periods and but few times a day at first, gradually increasing the length and frequency of the exercises as the muscles develop.

Let the child be taught to breathe through the nose alone, to hold the head well up, and to slowly inhale until the lungs are fully distended, five or six times in succession, after every club-swinging. Carrying something balanced on the head is an excellent means of cultivating an erect carriage, and if the weight be gradually increased the spinal supports are thereby strengthened.

Athletic contests, football, wrestling, boxing, etc., are usually to be avoided, though tennis, golf, hand-ball and base-ball are useful. The rule is that the youth must avoid all exercises that strain his muscles, or try them to the limit of their capacity. All his work must be easily within this limit, and neither his own ambition nor the taunts or persuasions of his comrades must be allowed to provoke him to the full display of his strength. The best way to insure this is to teach the boy to look on exercise and sport as means for attaining health rather than as exhibitions of prowess.

For these subjects a residence in the mountains is always advisable. The chest develops best by breathing the thin air of elevated regions. The blood is better oxygenated there, so that the brick-red complexion of dwellers over 8000 feet above sea-level excites the wonder and admiration of lowlanders; and the pure air offers few chances for infection. But woe to the mountain-bred youth who leaves his hill-tops to reside in the crowded city. He is doomed to the consumptive's grave. The mountaineer's pining for his native hills of which the poet has so often sung is strictly physical in its basis, and easily comprehended by the pathologist.



## V. DISEASES OF THE PLEURA

## PLEURISY

All inflammations of the pleura are attributable to microorganisms. In the exudate have been found tubercle and typhoid bacilli, strepto-, staphylo—and pneumococci. In emphysema the ordinary forms are micrococcus lanceolatus and streptococcus. Less common are the colon bacillus, proteus vulgaris, gonococcus and Friedländer's bacillus, with several saprophytic bacteria. In half the cases more than one form is present.

## DRY PLEURISY

In acute plastic pleurisy the inflamed surface is injected, dull, with bloody points, covered with a fibrinous exudate, which thickens from friction, becoming shaggy, yellowish or reddish-gray. Embryonic cells in the exudate develop new vessels and connective tissue. The opposing surfaces adhere in severe forms; in lighter cases the exudate becomes fatty and is absorbed.

This form of pleurisy rarely occurs primarily, from cold, or with a diathesis present. Secondarily it occurs with pneumonia and other pulmonary inflammations and with tuberculosis, when they extend to the pleura. In rheumatism, nephritis and alcoholism it is common, and it may also follow other serous inflammations.

The symptoms are of all degrees of severity. The pleuritic stitch in the side is noted. The pain is increased by chest-movement, hence breathing is restrained and cough suppressed. When the opposing surfaces have become glued together this is relieved. The fever ranges from 101 to 103 degrees—often it is hardly noticeable; pulse 90 to 100, small and soft. In many cases the disease is "latent" and the patient really never knows he is affected; while in some there is the evidence of a serious malady, fever of 104 degrees, chills, prostration, and other symptoms of corresponding gravity.

The chest-movements are restricted, percussion note unaltered, but a friction sound is heard in the early stages—the "dry-leather" rubbing, heard most clearly at the end of the inspiration. When exudation occurs fremitus is said to be diminished and some dullness to be detectable, but it must be quite unusual for enough exudation to appear to render this possible. Friction is then heard on expiration and inspiration. If the exudation is abundant enough to compress the lung there may be

bronchial breathing, and it may require a delicate diagnosis to determine if this is the case or the adjacent lung is pneumonic.

The diagnosis is made by the friction-sound, stitch, suppressed dry cough and respiration, with the absence of evidences of pneumonia—crepitus, rusty sputa and dullness. Intercostal neuralgia has tender spots, but no friction sounds or fever.

The attacks run on from a few days up to some weeks, and end in resolution with absorption, permanent adhesion of the opposing pleural surfaces, or death. A predisposition to subsequent attacks remains.

**Treatment:**—Put the patient to bed; limit the pain and spread of inflammation by applying as tightly as possible a bandage or corset to the chest, as in fracture of the ribs; relieve the pain if severe by leeching or cupping over the painful region and reduce the hyperemia to the lowest point by rapidly reducing the bulk of the blood. Our fathers did this by bleeding and in many cases this is a wise procedure to-day, but not in diathetic or cachectic cases, or in individuals whose vitality is deficient. Better enjoin the dry diet, total abstinence from fluids and bulky or watery food, give a brisk, quick-acting cathartic, and enough pilocarpine to induce free sweating, gr. 1-30 every ten minutes till full effect. With this relax the contracted capillaries (vasomotor spasm) by aconitine amorphous, gr. 1-134, restore contractility to the vessels in the hyperemic area (vasomotor paresis) by strychnine arsenate, gr. 1-134, and digitalin, gr. 1-67, and if needed subdue excessive heart-action and arterial tension by veratrine, gr. 1-134, given together every quarter, half, one or two hours, as indicated by the severity of the symptoms, till the desired effect is manifested. Here again we have an illustration of the singular fact that antagonistic remedies may be given together and each be appropriated by the tissues requiring its aid to restore physiologic equilibrium.

During convalescence respiratory gymnastics should be employed to restore the expansion of the lung and prevent adhesions. A full, long breath or two, taken every two hours, is a useful measure. Iodine and mercury, the great absorbents, should be applied locally and taken internally. The official compound iodine ointment, with a scruple of mercury biniodide to the ounce, may be rubbed into the skin twice a day. Internally iodoform, hydriodic acid, the iodide of iron, mercury, calcium or arsenic, may be given as indicated, alone or combined, the object being to get the greatest possible effect while the exudate is still young and amenable to treatment. We usually cover the skin over the affected region with belladonna plaster containing camphor, and have this worn for a month or more on dismissing the case. Bearing in mind the frequency of tuberculosis as a cause or sequence of this malady, we rarely

allow a patient to be beyond observation for a year after such an attack, and employ the measures usual for persons prone to that malady—diet, personal hygiene, occupation, climate, etc.

## SEROUS PLEURISY

While in the affection last treated a portion only of one pleura is affected, in the effusive form the whole of one sac participates in the inflammation. The malady is by that much the more grave. The pathological changes are similar, save that the exudation is more copious and serous, with a fibrinous layer of varying thickness on the surface of the affected membrane. The fluid contains varying amounts of fibrin, and may be but a few ounces, or several quarts, in bulk. It is clear or turbid, water-white, yellowish to brown. At first it settles in the most dependent parts, and if the whole sac is not filled, inflammatory adhesion takes place, confining the fluid there, so that it no longer changes its level with the changes in the patient's posture. This differentiates the malady from hydrothorax. In the fluid are found white and red blood-cells, fibrin, albumin, endothelial cells, sometimes cholesterin and uric acid crystals. Its composition is that of blood-serum, simple or concentrated.

If copious enough, the fluid causes compression of the lung, pushes the heart and mediastinum toward the opposite side and the diaphragm, liver or stomach downwards.

The causes are similar to those of fibrinous pleurisy. Exposure to cold or wet and traumatism are excitants. Many cases are due to tuberculosis, primary or following the same infection in the lungs or elsewhere. Pleurisy also occurs with rheumatism, pneumonia, typhoid fever and pericarditis, or nephritis, cancer and cirrhosis of the liver.

**Symptoms:**—In secondary pleurisy the attack may be masked by the primary disease. In primary attacks the onset is also often insidious, rarely sudden, with chills and high fever. The stitch in the side follows, becoming worse on exertion or drawing a long breath. Dyspnea follows, with voluntary restraint of breathing and coughing. The sputa are scanty, mucous, sometimes blood-streaked. The fever is of medium intensity, higher in evenings, the pulse rapid and small. In latent forms there may be a decline in health for weeks before the malady is recognized, with anorexia and emaciation, or headache and dyspeptic symptoms. Remissions may occur, with relapses, each leaving the level of the effusion higher, until the whole sac is full of serum, the lung pressed solid.



The stitch is not noted in the insidious form, and disappears when the effusion separates the inflamed surfaces. The breathing is restrained before effusion, shallow and somewhat hurried afterwards, dyspneic if the effusion is profuse and rapidly thrown out. But fever has as much to do with the production of dyspnea as has the actual pressure on the lungs. Cyanosis, however, depends solely on the latter. The cough is dry unless bronchitis coexists. The fever is not high, is usually regular in range, and subsides by lysis. On the pleuritic side it is somewhat higher than on the other. The pulse corresponds with the fever, the volume and tension are lowered. Pressure on the heart and great vessels may occasion irregularity. The appetite is poor, the bowels confined. The urine is lessened, the specific gravity high until absorption begins, when diuresis occurs.

The physical signs are the same as in plastic pleurisy, except that in the serous form there is dullness corresponding with the effusion, the intercostal spaces bulge, the respiratory movements are absent. Tactile fremitus is lost early. The motion of the affected side on respiration is almost *nil*, while the other side shows the usual expansion. The dullness caused by the effusion is only noted posteriorly in slight effusion, and rises higher there than in front. If not confined by adhesions the fluid changes with change of posture. If it ascends to the lower border of the third rib, the note is tympanitic above it (Skoda's resonance). In large exudations the cracked-pot sound may be found below the clavicle, and "Williams' tracheal tone" may be obtained.

Auscultation reveals dry friction sounds in the first stage. When effusion occurs this is lost, the vesicular murmur weakens and even disappears, while if the lung is wholly compressed the bronchial sounds may be lost; if not, there is bronchovesicular breathing above the fluid. The vocal resonance may simulate the bleating of a goat (Laennec's egophony).

During absorption the distention subsides, and respiratory movement returns. If the lung does not re-expand the intercostal and clavicular spaces sink, the ribs are drawn together, the spine curves laterally, the heart is drawn over, and this perhaps, with bronchiectasis and emphysema, fills up the vacuum. As the fluid recedes, if the lung expands the normal sounds gradually reappear, and displaced organs resume their proper locations. Friction sounds may remain for a long time. The lower part of the lung may remain compressed.

Tubercular pleurisy may be acute, subacute or chronic; primary, or secondary to tubercle in the lungs, peritoneum or elsewhere. The effusion is often sanguineous. Recovery is possible.

Diaphragmatic pleurisy occurs with acute symptoms, moderate effusion, pain along the tenth rib, increased by deep inspiration and by pressure over the diaphragm into the tenth rib, dyspnea, cough, and nausea or vomiting. The fever is unusually high, the anxiety extreme. If the effusion is purulent the lower intercostals bulge, with edema later.

Local pleurisy may occur with a moderate effusion, encysted by adhesions, in any part of the chest. The diagnosis may be assisted by aspirating.

Interlobar pleurisy may cause encapsulated collections between the lobes. It is more frequent in the right lung between the upper and middle lobes. The ailment may be denoted by the appearance of pus in the sputa, the previous symptoms having been indeterminate.

Hemorrhagic pleurisy occurs from the tubercular infection, cancer, nephritis, hepatic cirrhosis, septic debility, old age and alcoholism, and perhaps without detectable cause.

**Diagnosis:**—Pneumonia begins with a chill, thoracic ache, rusty sputa (at first gray), intense fever, ending by crisis, marked prostration, flush on one cheek, herpes, pneumococcus in the sputa; signs of increased tactile fremitus, crepitus at first; imperfect dullness in second stage, bronchial breathing, bronchophony, and yields blood on aspiration.

Pleurisy shows a less marked onset, stitch-pain, cough dry and repressed from pain, no pneumococci in sputa if any are raised, moderate fever, ending by lysis, some debility rather than prostration, face pale, no herpes, thorax distended on affected side, lessened tactile fremitus, dullness absolute over effusion, neighboring organs displaced, dullness may shift on change of posture, breath-sounds absent, vocal resonance less, egophony, friction sounds in first and third stages, aspiration yields serum.

Tubercular consolidation has a different history, more fever, rapid decline, the tubercle bacilli in the sputa.

Hydrothorax has the history and causes of dropsy, and the fluid shifts on change of posture; there is no fever, it is bilateral, no pain or friction-sounds. The specific gravity of the fluid is below 1015, that of pleurisy above 1017.

Tumors distend the thorax partially, not beginning at the most dependent part, the tactile fremitus and vocal resonance are higher, the history differs, there are no friction-sounds except from accompanying pleurisy. Hepatic tumors, cysts or abscesses cause dullness, beginning below but at a limited point, and at all stages there is usually resonance on one or both sides, where in pleurisy there would be dullness. A puncture settles doubtful cases.



Pericardial effusions cause urgent dyspnea, with feeble heart-sounds, the heart is not displaced, the dullness is in front rather than behind, and the history of rheumatism may be had. The history may separate tuberculous from other forms of pleurisy, the serum may be examined for the bacillus and guinea-pigs inoculated with it.

There is no definite course to a pleurisy. The inflammation may last one to three weeks. The effusion is usually absorbed fast or slowly, much as it was effused. Large effusions may persist or develop into empyema. The absence of bacteria indicates tuberculosis. The prognosis in simple serous cases is good. Death sometimes occurs from a sudden and copious effusion.

**Treatment:**—The management of this form of pleurisy is identical with that of the fibrinous form, during the first period. We have, however, to deal here with a bulky effusion, which compresses the lung and may permanently destroy its power of expansion. The question arises, how to deal with this effusion. In some instances the compression has been relieved in a few days and yet the lung failed to unfold. In such cases it is probable that there has been an exudative inflammation in the carnefied lung-tissues permanently gluing them together. On the other hand, such profuse exudations have existed for many weeks and still the lung resumed its functions.

Paracentesis thoracis is a simple and harmless operation when aseptically performed, and even in the febrile period, when the effusion is so bulky as to compress the lung into an airless mass, it seems wise to remove a portion of the fluid. In double pleurisy, or when respiration is seriously embarrassed, or signs of commencing hyperemia appear on the unaffected side, or when syncope, orthopnea, cyanosis or murmurs in the displaced heart occur, enough fluid should be withdrawn to give relief. No attempt should be made to withdraw all the effusion, as this would bring inflamed pleura together and increase the pain and fever.

When the fever has subsided, the sooner the fluid is aspirated the better. No good object is obtained by its presence, and every day the lung remains compressed adds to the danger of permanent disability. When a goodly portion has been removed and the pressure relieved, absorption usually sets in. If the lung does not at once expand some danger would ensue by removal of its support. The fluid should therefore be allowed to drain away slowly and spontaneously, not solicited or forced. If dyspnea, incessant cough, sharp pain or a sense of oppression occur, the needle must be at once withdrawn.

The aspirator must be aseptic, the skin washed with soap, ether and bichloride solution 1 to 1000. Raise the arms so as to separate the ribs



and insert the needle close to the upper border of the rib. The best places are the sixth interspace on the right, the seventh on the left, under the middle of the axilla; or just below the outer angle of the scapula in the seventh right or eighth left spaces. If the pleura is very thick or a mass of lymph is struck the fluid may not be found at the first puncture. Larger needles are required as the fluid becomes thicker. From four to twenty-four ounces may be taken at one time, more during the febrile stages than later. Absorbent combinations should be employed to stimulate the removal of the effusion, with the dry diet. Iron iodide is often indicated by the presence of anemia, gr. 1-12 every two hours. In the young where lime is needed, calx iodata offers an admirable resource, gr.  $\frac{1}{2}$  every hour. \*

### EMPYEMA

Sometimes the pleuritic exudate contains pus; similar to the ordinary pus unless pulmonary gangrene is present, when the fluid is exceedingly fetid. The inflammation is more intense than in common pleurisies, and the tissues are thickened, granular, perforated or eroded. The altered membranes consist of new connective tissues, bloodvessels and leucocytes. Empyema may follow ordinary pleurisy. In children it occurs early or from the first; it may be secondary to septic fevers, result from invasion of the pleura by cancer or tubercle, or follow penetrating wounds. The organisms most frequently met are micrococcus lanceolatus, streptococcus, staphylococcus and tubercle bacillus. Pneumococcus cases are milder. Leptothrix occurs in putrid effusions.

**Symptoms:**—There may be an acute onset, chills, fever, prostration, severe pain made worse by breathing or exercise. If gangrenous, the prostration soon becomes extreme and death occurs in a few weeks. Often the acute symptoms subside in a week and chronic symptoms arise. Dyspnea is apt to be more prominent than pain and cough; but the evidences of sepsis—irregular chills, fever and sweating, rapid wasting, etc.—soon predominate. Peptonuria is a diagnostic evidence of value, though simply indicative of suppuration, not excluding tubercle, etc. The same may be said of indicanuria. Leucocytosis is always present. It is especially in empyema that spinal curvature is likely to occur.

The pus may discharge through the lung, causing pneumopyothorax; less often through the skin, esophagus, pericardium, stomach or peritoneum.

The signs are those of ordinary pleurisy. The chest-wall may become edematous, the pus pointing and discharging externally. The pus does

not change level with posture as readily as a serous effusion. Baccelli's sign is the transmission of the whispered voice through a serous collection, not through pus. The cardiac pulsations are sometimes transmitted through empyema, rarely through a serofibrinous exudation. The necessary elements are a copious effusion, relaxed thoracic wall, and a strong heart-beat. It is usually on the left, front and side.

Empyema is diagnosed from ordinary pleurisy by the rapid decline and other evidences of sepsis, and by the aspirator. Pulsating empyema does not appear in the location of aortic aneurism, there is neither heave nor bruit, and the constitutional symptoms differ totally.

The prognosis depends first on the cause, second on the treatment, third on luck. Death may occur from the discharge of pus in a fatal way, from exhaustion, or from intercurrent or complicating disease. Children recover better than adults. Recovery occurs only with gradual adhesion of the pleura, obliterating the cavity, and subsequent retraction.

**Treatment:**—In children it may be allowed three weeks for nature to cure. In adults a large empyema should be aspirated at once. Following pneumonia, it is best to make a free incision and drain. Open in the fifth or sixth intercostal space, outside the nipple, the incision being an inch long. Estlander's rib resection is not necessary if free drainage can be secured without it. If the pus is offensive the cavity should be irrigated antiseptically; otherwise insert iodoform gauze. Expansion of the lung is favored by systematic exercise. James' method is to have the patient force water from one bottle to another by means of tubes, the effort being gradually increased. It is best to use boric acid, permanganate or aromatic antiseptic solutions for irrigation, as bichloride, phenol and peroxide are unsafe.

Every effort should be taken to keep up the strength, by rich feeding, etc. The arsenates of iron and quinine each gr. 1-6 and of strychnine gr. 1-30 should be given every two to four hours, with calcium sulphide gr. 1 seven times a day to restrain suppuration. Whether the latter would cure without operation I am not prepared to say, but it is the most effective antagonist of suppuration-germs yet produced. Nuclein solution should be given up to a dram daily.

## CHRONIC PLEURISY

Chronic serous pleurisy may follow the acute form or develop insidiously. There may be scarcely any symptoms except dyspnea on exertion, perhaps a sense of fullness in the chest, an occasional long-drawn inspiration. The pulse may be faster and slight evening fever be present,

with some fall in the patient's strength and in his weight. The malady may develop into empyema, especially in children. The affection runs on for months or years, and may end in tuberculosis.

Chronic dry pleurisy may also follow the acute or chronic serous form. The fluid is absorbed rapidly at first, more slowly as it thickens, the pleura come together and adhere, forming a fibrous capsule compressing the lung.

Some cases are dry from the start, and may present no symptoms of effusion. The pleura adhere, the respiratory motion is restricted, the sounds are weak, the other lung is hypertrophied, the heart displaced, spine curved, thorax distorted. Sometimes vasomotor equilibrium is disturbed, flushing or sweating unilaterally, or dilatation of the pupil, occurring.

#### PLEURAL EFFUSION.

History of pleurisy,

Unilateral,

Effusion following change of posture only at first, being soon encysted by adhesion of pleura.

Fever,

Heart displaced.

#### HYDROTHORAX.

General dropsy,

Bilateral,

Fluid follows change of posture throughout.

No inflammatory adhesion,

No fever,

Heart in normal position, but muffled by pericardial effusion.

The treatment looks to removal of effusions if present and improvement of nutrition. Carefully regulated diet, gymnastics, the pulmonary and hygienic regime in general, and climatotherapy, are the leading indications. The tonics, digestives, reconstructives and absorbents, are required when indicated. Cases vary too much for a fixed line of treatment. The persistent action of arsenic, mercury and iron iodides, in moderate doses continued for many months, gradually brings about absorption of the effusion. Iron iodide, gr. 1-6, with gr. 1-67 each of the others, may be given three to seven times daily; the bowels and kidneys being kept in activity to stimulate the removal of the loosened debris.

#### PNEUMOTHORAX

If air be admitted to the pleura the lung collapses into a firm mass attached to the bronchus, the air fills the sac, obliterating the intercostal depressions and giving a clear, tympanic percussion note over the entire



side, with no respiratory sounds whatever. If the admitted air is sterile it is rapidly absorbed; if it carries the germs of suppuration pyopneumothorax develops.

The causes of pneumothorax are: Perforation from a tuberculous cavity, gangrene, bronchopneumonia, glandular suppuration, abscess, cysts, rupture of air-cells by strain, perforating empyema, cancer or esophageal abscess, bronchiectasis, cancer or ulcer of stomach or colon. Gases may be developed in the pleura by certain organisms. Wounds may penetrate the pleura.

The occurrence of pneumothorax is attended by sudden and intense dyspnea and pain, sometimes cyanosis, hurried breathing, the pulse weak and fast, cold sweat, and collapse, in which death may occur. The temperature falls below normal and then rapidly rises as pleurisy develops. It is usually hectic. As suppuration ensues edema of the hand on the affected side sometimes occurs, soon disappearing. As fluid collects in the pleura, when the patient shakes the chest splashing is heard, the "Hippocratic succussion," or "metallic tinkling," from drops falling into the fluid. "Wintrich's sign" is a change in the pitch of the percussion sound as the mouth is open or closed. The "coin-test" is considered pathognomonic. A coin is held on the front of the chest and tapped with another coin, while the examiner's ear is applied to the back of the thorax, when he hears the intensified echo of the sound produced. The cracked-pot sound and Wintrich's sign are more frequent in a large pulmonary cavity than in pneumothorax. The former does not dislocate the organs and has no response to the coin test or succussion.

Gastric flatulence has been mistaken for pneumothorax. Subphrenic abscesses containing air occur, mostly on the right, from gastric ulcer. Diaphragmatic hernia results from injury or congenitally, and is recognized by its cause, rumbling, and possible reduction. Empyema is slow in development and has none of the specific signs mentioned.

The prognosis depends on the cause.

**Treatment:**—Combat shock and collapse with glonoin and atropine, gr. 1-250 each, every fifteen minutes till reaction occurs; relieve pain by morphine if necessary. Great dyspnea may indicate the wisdom of drawing off the air with an aspirator, but if the malady is due to a wound that is capable of healing it is better to leave the lung collapsed till this has taken place. In fact, Nuverricht in cases of pleural fistula inserts a tube to secure the free access of air until healing is complete. The tendency to suppuration calls for saturation with sulphides, while the vitality is sustained by full doses of nuclein and the tonic arsenates—iron, quinine and strychnine. Murphy's experiments have shown that sterile

## HYDROTHORAX

gases are rapidly absorbed from the pleura. If suppuration occurs the treatment is that of empyema.

## HYDROTHORAX

Hydrothorax signifies the presence of serum in the pleura, usually in both, and occurring in general dropsy, especially in hydremia. It also occurs in chronic diarrhea, dysentery, leukemia, pernicious anemia, cancer, malaria, syphilis, scurvy and compression of the thoracic duct.

The symptoms are dyspnea, cyanosis, cough, weak heart, general debility, with dullness on percussion, the fluid shifting with change of posture.

The treatment is that of the causal malady. Tapping is done as in serous pleurisy.

## PART V

# DISEASES OF THE CIRCULATORY SYSTEM

### I. DISEASES OF THE PERICARDIUM

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#### ACUTE PERICARDITIS

**Anatomy:**—The inflammation may be confined to a part of the serosa only, or affect the whole sac and extend into the myocardium or the fibrous layers beneath the parietal layer. The inflammatory process usually commences at the upper part, about the origin of the great arteries, as a dilatation of the serous capillaries and arterioles, with desquamation of the endothelium. The disease may stop here or proceed to exudation.

In the fibrinous form the exudate occurs as a thin grayish or yellowish pellicle, loosely attached to the underlying surface. This becomes thicker, and more adhesive. The heart motions pulling this apart give rise to appearances known as *cor hirsutum*, *villosum* and *tomentosum*; compared to the surfaces of two pieces of buttered bread or adhesive fly-paper pulled apart. Thicker and denser masses cause adhesions, known as recent by their color. This form is believed to be tuberculous in many instances (Osler). It may end in the chronic form.

Fluid effusions may be serous, purulent or hemorrhagic. Serous effusions generally contain floating fibrin in large or minute masses, settling on the walls in creamy deposits. The presence of leucocytes or red blood elements gives rise to transition forms. Abundance of cells characterizes the purulent variety. Pus forming may burrow, and appear beneath the skin in the neck or in the first intercostal space on the right side. Sometimes the pus becomes sterile and undergoes calcification; more commonly it must be removed.

The hemorrhagic form is perhaps most marked in scurvy, but is seen in cancer and in tuberculosis. Usually the quantity of the fluid is large, and the effusion may occur suddenly, causing acute anemia.



In the exudate have been found the pyogenic bacteria, the pneumococcus, and the tubercle bacillus. Putrefactive organisms cause fetor, the *b. aerogenes capsulatus* causes the evolution of gas. The presence of microorganisms can not always be demonstrated, but their absence is not thereby proved.

**Etiology:**—Primary pericarditis occurs only from trauma (Babcock); secondary attacks being due to extension from neighboring organs, general diseases or hemic disorders. Flexner found the micrococcus lanceolatus most frequently and in eleven cases where this was detected, pneumonia was present in eight. Rudini attributed the disease to the *staphylococcus aureus*.

Pericarditis may occur in the course of many infectious maladies, without being recognized unless something arises to induce the physician to make a critical examination of the cardiac conditions. The resulting products may be observed.

Rheumatism is the most common precedent of pericarditis. It is more apt to attend first attacks of rheumatism, the frequency depending largely on the treatment of the causal malady. Even mild forms are likely to be followed by pericarditis, in children; but the latter is infrequent if but one joint is affected. Babcock says it may appear at any time during the rheumatic attack, or even precede it, but generally the symptoms appear about the fifth day. Young adults are more frequently affected, especially if their occupation entails exposure.

All forms of nephritis are attended by pericarditis, more frequently than is usually supposed, especially the contracted kidney, and cases where uremia occurs.

Acute pneumonia was accompanied by pericarditis in 92.4 per cent of 79 fatal cases seen by Preble. Pericarditis has also been noted during the course of or subsequent to attacks of scarlatina; and in connection with erysipelas, variola, typhoid fever, measles, cholera and diphtheria. To this list Flexner adds bronchitis, leg ulcer, sloughing myoma, gastric cancer, tonsillitis and peritonitis. Mediastinal tumors, bronchial adenitis, abscesses, costal caries, empyemas rupturing into the sac, perforating esophageal or gastric ulcers, and intraperitoneal abscesses, are sometimes attended by pericarditis, usually purulent. Acute inflammation may be caused by aortic aneurism, while tubercle usually occasions more chronic forms.

The hemorrhagic variety occurs secondarily to scurvy, purpura or hemophilia; possibly in tuberculosis or cancer. Old age and alcoholism also favor this form. Traumatic cases are not necessarily accompanied by perforation of the pericardial sac. Chronic valvular heart diseases predispose to pericarditis, especially aortic leaks.

## FIBRINOUS PERICARDITIS

**Symptoms:**—The invasion and even the existence of this affection are apt to be masked by the symptoms of the original malady. The pericarditis may be unsuspected, or latent. But a sudden rise of fever, or the development of delirium and nervous crises, without apparent cause, in the primary malady's course, should direct attention to the heart, especially in children suffering with rheumatism.

Pain, or a sense of distress, occurs early, in the cardiac region or epigastrium, sometimes radiating over the chest or to the left arm. If the posterior portion of the area is affected the pain may be felt between the shoulders. Pain and tenderness have been noted along the larynx. Cutaneous hyperesthesia may hinder percussion. Dysphagia may be present, and pain with each pulsation. The pain may be sharp or dull, continuous or intermittent, it is worse in neurotics, and subsides when effusion occurs.

In some cases a dry, irritative cough is present, resembling that of pleurisy. The pulse is fast, soft and regular in the early stages. Respiration may be rapid and shallow, repressed as in pleurisy. The fever does not exceed 103; continuous or remittent. Supervening upon chronic renal or cardiac maladies, not rheumatic, fever is slight or wanting. Its duration varies but may average 18 days.

Anorexia, constipation and flatulence are generally present, as well as scanty high-colored urine, disturbed sleep, restlessness and facies indicative of suffering in children. With them also we are apt to have marked nervous phenomena, twitching, restlessness, subsultus, low delirium and excitement. Dyspnea is not prominent until the effusion embarrasses the heart and lungs, unless endocarditis accompanies, when this symptom occurs earlier.

The foregoing assemblage of symptoms has been compiled from many cases and probably no one case ever presented all of them. In fact, there may be so little indication of the malady that in rheumatism and other affections liable to pericardial complication it is wise to examine the heart carefully at every visit.

Partial pericardites may run their course to recovery within a week. Severe forms run for some weeks, and may end in death, especially in case of children with preëxisting cardiac lesions, or in recovery with permanent injury to the pericardium. The heart may dilate, especially with children, or the inflammation may extend to the heart muscle, involving peril. Thick deposits of fibrin on the heart may seriously interfere with its function and with nutrition.

**Diagnosis:**—Inspection may reveal an anxious expression, disturbed respiration and heart-action, but these have little significance unless as pointing to coexistent disease. Palpation may detect fremitus in the second or third intercostal space to the left of the sternum. This is not frequent. The peculiar gliding character of the friction-fremitus distinguishes it from an endocardial thrill (Babcock). Moderate pressure may increase, forcible pressure lessen or efface it.

Auscultation reveals friction sounds early. This may be heard in the second, third or fourth intercostal space at the left sternal margin; sometimes over the apex, or even over the whole cardiac region. It is not synchronous with systole or diastole or with either heart sound, but may accompany, precede or follow them. The rhythm of each case is peculiar and uniform to it. The to-and-fro rhythm resembles a double aortic bruit but is not identical with it. This peculiarity is due to the variations in friction during the auricular and ventricular systole and diastole, presenting varying conditions. The shorter first part occurs during the auricular systole, the two longer during the ventricular systole and diastole. Endocardial murmurs are not affected by pressure as exocardial murmurs. This sound may disappear temporarily. Its nature depends on the nature of the exudate and the strength of the heart contractions; its quality on the consistence of the fibrin—creaking, crackling, usually a soft brushing. It is apt to be louder when the patient is erect but the reverse may happen. Forced inspiration may make the sound louder—or the reverse. The heart sounds are not affected by pericarditis alone.

Pressure affects the friction sound as it does the fremitus.

The diagnosis is usually simple, the disease being readily recognizable when attention has been called to it, by the preëxistent disease and pain about the heart; the characteristic rubbing, thrill and murmur confirm the suspicion.

Endocarditis can with difficulty be excluded unless valvular murmurs are present, and the effects of pressure on the fremitus and the friction murmur are evident. In pleurisy the friction sound ceases when respiration is suspended. It must not be forgotten that pleurisy may coexist. Pneumonia presents the initial chill, high continued fever, cough, rusty sputa, crepitation, dullness, bronchial breathing, alteration of the ratio between pulse and respiration, and the characteristic course. Babcock describes two cases in which aortic aneurisms were taken for pericarditis until the subsequent course corrected the diagnosis.

**Prognosis:**—This is serious in children with rheumatism. Extension to the heart muscle may be inferred when the pulse becomes thready and



intermits, the first sound at the mitral is feeble and muffled, the second aortic sound diminished. It is a condition of great danger. Serious implication of the nervous system is a grave indication. Even when recovery from the acute attack occurs, adhesions may be left which will lead to future difficulty. The plastic exudation is rarely absorbed. Occurring with endocarditis, pleurisy, pneumonia or chronic nephritis, the prognosis is graver than in rheumatic forms.

## PERICARDITIS WITH EFFUSION

A variable proportion of fibrin is always present in the serous effusion and when the first exudation is plastic a large serous effusion may occur later. The quantity varies from a few drams to a quart or more. It may occur gradually or distend the sac within twenty-four hours. In the purulent form we find pus with little fibrin but various bacterial elements. In the hemorrhagic form, blood may be present in the primary effusion or it may appear later in a serofibrinous fluid. These effusions simply indicate varying grades of the disease.

**Symptoms:**—The effusion collects in the lowest portion of the sac, and as in pleurisy by stopping the friction of the inflamed surfaces puts an end to the pain. The fever and cough, however, continue. As the exudation relieves the pain, it gives rise to symptoms due to pressure on the neighboring organs. Yet there is not always a direct relation between the bulk of the effusion and the severity of the pressure effects. Children are less apt to complain of these but rather display restlessness and other nervous phenomena. The face may be pallid or bluish white, the jugulars turgid, the pulse weak, rapid and soft. Its rhythm may be irregular, and in the later stages this indicates grave implication of the heart muscle. Pressure upon the heart causes general disturbance of the circulation. The auricles yield to the pressure more readily than the ventricles, and the supply of blood to the heart is obstructed. The left lung is compressed, giving rise to dyspnea; and, if the pressure be very great, to cyanosis. This, with the cerebral venous congestion, seriously interferes with sleep. The appetite is destroyed and swallowing may cause severe pain. The urine is scanty. Tympanites adds to the dyspnea. The liver is passively congested and tender. Constipation exists at first until the engorgement of the intestines causes serous diarrhea. If protracted, dropsy of the limbs follows.

The fever varies widely, but sinks when effusion occurs. Pressure symptoms occur more decidedly when the effusion rapidly distends the sac. If the effusion is purulent, the symptoms vary with the micro-

organisms present. The distention is then usually very great. Septic symptoms occur, such as chills, sweating and fever of the hectic type, septicemia being most marked when the pus is fetid; prostration then occurs early and is extreme.

Hemorrhagic effusions also occasion most distress when rapidly poured out.

There is no typical course to this form of pericarditis. Rheumatic cases may end within a week or be protracted to a month, or even become chronic. Improvement may be followed by relapses until the patient is worn out. The course is greatly modified by the original disease. Occurring with renal disease, the course is apt to be slow and latent:

Occurring in rheumatic children, permanent cardiac disease remains. Purulent forms rarely tend to resolution, the patients dying sooner or later from septicemia. The scorbutic form often proves fatal in one or two days. Some times the exudation is completely absorbed, leaving the patient in excellent health.

**Diagnosis:**—The effusion may be evident on inspection, in young patients with yielding thorax, or the intercostal spaces may bulge. The apex beat disappears, the ventricular impulse is diffused or absent, or it may be lower than normal. The pressure effects are evident.

Fremitus ceases when the sac is distended. Palpation may show increased internal thoracic tension. Fluctuation is rare. Ewart found in some cases the head of the left clavicle so elevated that the first rib could be felt up to the sternum. The pulse is rapid, may be arrhythmic, or *pulsus paradoxus*, the tension markedly low.

Percussion is the most reliable means of diagnosis, as by it very small quantities of effusion may be recognized. The dullness forms an irregularly triangular area with the apex about the first intercostal space to the left of the sternum. The lower margin may reach the seventh intercostal space. To the left it extends beyond the apex beat, which distinguishes pericardial effusion from enlargement of the heart. In pericardial effusion the line of demarcation between the effusion and the lung is much more abrupt than it is in dilatation of the heart, unless the lung overlaps the distended sac. Rotch's sign is the development of a small triangle of dullness in the fifth right intercostal space when the effusion first takes

The friction sound disappears when effusion occurs, and reappears as absorption permits the inflamed surfaces to again come in contact. However, the friction sound may persist even with a large effusion. The heart sounds are muffled and may be almost inaudible, especially the sounds at the apex. The pulmonic second sound is accentuated, the aortic diminished in proportion as the venous congestion increases.



Compression of the lung causes a loss of the normal resonance. Below the left clavicle percussion elicits Skodaic resonance. Pins' sign is dullness and bronchial breathing below the left scapula. When the patient leans forwards, this gives way to tympanitic resonance and crepitation followed by vesicular respiration. Ewart found dullness in extensive effusions posteriorly from the spine to the internal border of the scapula. At this place the respiratory sounds are absent, the voice sounds feeble.

When the effusion is free, the diagnosis is easy. It is, however, more difficult to determine the nature of the effusion. In rheumatism it is usually serofibrinous; in septicemia, empyema, gastric ulcer or perforating wounds, it is generally purulent. Septic symptoms indicate the presence of pus. An effusion rapidly developing in scurvy, purpura or cancer, with quickly supervening anemia, indicates hemorrhage. The diagnosis, however, usually requires a puncture. Emphysema with adhesions may mask the area of dullness, or force the effusion into unusual situations. If this is confined to the posterior part of the sac, diagnosis is difficult. We then have evidences of inflammation, with pressure on the esophagus and bronchi, causing difficulty of swallowing and breathing. Dilatation of the heart with retraction of the lung presents a dull area resembling that of effusion, and if fatty degeneration weaken the impulse, the diagnosis may be impossible. The main point is that in dilatation the apex beat corresponds with the outer lower margin of dullness, while in effusion the dullness extends beyond the apex beat. This may be distinguished better when the patient sits up than when he is lying down. If the diagnosis cannot otherwise be made, heart-tonics like digitalin may strengthen a weak heart, restoring the apex beat and heart-sounds, or if the case be one of pericarditis, cause absorption of the fluid and return of the friction sound.

There is some similarity in the symptoms of pleurisy, but the area of dullness is different. Left pleurisy displaces the heart to the right; vesicular sounds are absent. Pleurisy rarely, if ever, causes dysphagia and generally the presence of the antecedent disease directs attention to pericarditis. The history and physical examination may be depended upon to exclude mediastinal tumors and localized tubercle or pleuritic adhesions.

**Prognosis:**—Purulent forms are dangerous unless early diagnosed and effectively treated. Hemorrhagic forms rapidly prove fatal if acute; if chronic, the results depend on the primary disease. Rapid large effusions are always dangerous. Inflammation of the myocardia or degeneration adds seriously to the peril. Pressure or disease seriously embarrassing the heart or the lungs is of grave omen. Accompanying



endocarditis or preexistent valvular disease increases the gravity. The same may be said of nephritis, pulmonary tuberculosis, or other incurable chronic diseases. Occurring with rheumatism in young children, permanent disease of the heart is very probable. Aged and cachectic patients usually succumb. Even when recovery from the acute disease takes place, there may remain a myocarditis or obliteration of the sac.

**Treatment:**—It is evident from the serious prognosis of pericarditis that it is of the first importance to prevent the supervention of this disease. This renders it necessary that the physician should appreciate the possibility of its occurring in other maladies as well as in rheumatism. The prompt and effective treatment of rheumatism, however, is the most important point in the prophylaxis. Physicians as a rule fail to appreciate the importance of protecting their patients, with infectious diseases, from exposure to draught.

For the treatment of rheumatism and other infections causative of pericarditis, we refer the reader to the chapters on those topics. The patient must be kept quiet and in the recumbent posture; even the exertion of rising to a sitting position increases the work of the heart and also the inflammation. Babcock prefers the application of cold. We are well aware that we stamp ourselves as heretics by affirming our sincere belief that the mercurials are of greater benefit than the application of cold. Counterirritants, however, often relieve the pain and when this is the case they are certainly preferable to opiates. Weighty applications are obviously to be avoided. The bowels should be promptly and thoroughly emptied. Give gr. 1-6 of calomel every half hour for six doses, followed by a dose of saline laxative, and repeat one or both as often as may be necessary. Fecal toxemia most assuredly does not lessen the sufferings or the peril of the patient. Elimination may be increased by the administration of veratrine, gr 1-134, every two to three hours. We are not disposed to accept the orthodox dictum as to the impossibility of influencing the inflammatory process; and we would advise therefore, the administration of mercury biniodide gr. 1-67 and calx iodata gr.  $\frac{1}{3}$  together, every hour, until evidences of iodism are manifested. It has not yet been proved that mercury and iodine do not check the tendency to plastic exudation and hasten the absorption of that already effused. If the disease is suppurative, we may add to the above the use of calx sulphurata, giving 1-2 gr. every hour, until saturation; then enough to sustain this effect. Even though the disease be due to microorganisms, the remedies whose good effects were explained by the old antiphlogistic doctrine may still be given with benefit though the explanation of their action then offered is now no longer accepted.

Pain and restlessness may require the administration of codeine, cannabis or iodoform, in doses sufficient to accomplish the purpose. Sleep may be secured by the use of one of the above or by grain doses of camphor monobromide, repeated ever hour. The cough is, we think, better relieved by the application of mustard over the pneumogastric nerve than by the use of any drug sedatives. Of the latter, zinc cyanide is better than any opiate; gr. 1-6 of this may be given every half-hour if necessary, and this will soothe restlessness and irritation much better than any drug which locks up the eliminants. The dosage should be so arranged as to secure the desired effect without weakening the heart. Nausea also is best relieved by counterirritation over the pneumogastric nerve; if indeed nausea be possible after the alimentary canal has been completely unloaded, and elimination is free. The fever may require a few granules of aconitine. For rapid violent heart-action in the early stage, Babcock prefers the ice-bag over the heart, but again we say that such a condition can scarcely occur with the alimentary canal and the eliminants properly attended to. Digitalin is not indicated unless the weak rapid pulse, of low tension, with comparatively empty arteries and engorged veins, indicate the wisdom of strengthening the heart and at the same time checking the escape of blood from the arterioles into the capillaries. Very small doses (gr. 1-67) should be given and carefully repeated at hourly or half-hourly intervals, until the desirable effect is manifested. The only preparation for such delicate dosage is obviously the Germanic digitalin, which is soluble in water and manifests its effects within half an hour, or sooner if administered in a little hot water and absorbed from the mouth instead of the stomach. Strychnine is usually indicated from the first; the arsenate being preferred as it is desirable to induce degeneration of the exudate as speedily as possible. The doses must be small, gr. 1-134 every hour being usually sufficient. The food should consist of raw eggs, milk and fruit juices, in quantity not exceeding four ounces, but repeated every four hours, with a small cup of coffee between the feedings. But little water should be given in addition to what is contained in the food. Should distress follow the administration of food, or of the eight ounces of water required for the saline, the bowels should be emptied by small enemas of glycerin, or of saturated salt solution, and the food thrown into the colon.

When the fever subsides and the exudation appears, the indications are changed. Supporting remedies are still more imperatively required; but the antipyretics may be laid aside for absorbents. The most powerful absorbent combination known to the writer consists of the following: Mercury biniodide gr. 3-67; arsenic iodide gr. 1-67; iodoform and



phytolaccin, of each gr. 1-2; the whole to be given four times a day. The ointment of mercury biniodide should still be applied over the heart. If the dyspnea and pressure symptoms are imperative, the fluid may be removed by tapping. Absolute rest is still more imperatively demanded than at the first. If the urine becomes scanty, more digitalin is needed or normal saline solution thrown into the colon. The congestion of the liver is best relieved by the saturated salt enemas mentioned. The point usually selected for puncture is the fifth left intercostal space, close to the sternum, or an inch or more from the bone to avoid the internal mammary artery. Purulent effusions should be removed by surgical methods. The remedies advised are not all needed at once but to be given alone or combined as may be indicated.

## CHRONIC PERICARDITIS

Chronic pericarditis may involve the serous layer alone or may extend to the mediastinum; quite rarely the sac is distended with fluid. The first form, as adherent pericardium, is more frequently found in the dissecting room than in the clinical amphitheater.

**Anatomy.**—The chronic malady follows the acute form, the fibrinous exudate becoming organized. Granulation tissue forms, and is developed into fibrous cicatricial tissue. The two layers may adhere over a portion or all the pericardial surface; this being more common at the base of the heart. If adhesion does not occur the remains of the disease are shown by white patches, milk-spots or *macula tendineæ*. The thickening is generally marked, especially in tuberculous cases. Calcification sometimes follows purulent exudations, leaving lime in plates or a complete covering over the heart, whose motion is permitted by cracks and fissures in this coat.

Endocarditis and valvular disease may coëxist, or the pericardial malady may occasion hypertrophy and dilatation, with the usual degenerative sequences.

The inflammatory process extending to the mediastinal tissues gives rise to induration, the connective becoming hyperplastic, and adhesions forming between the pericardium and the diaphragm, pleuræ, esophagus, spine or the anterior wall of the thorax. Cicatricial contraction may lessen the lumen of the superior vena cava, aorta or pulmonary vessels, or the esophagus. The effects extend far beyond the heart, the interference with the circulation causing disease in the lungs and other organs.

The form in which effusion is found may follow repeated acute attacks, or show the tendency to the chronic type from the beginning. In the



former the quantity of effusion fluctuates, in the latter it slowly increases. This form is more frequently met in aged persons, and with chronic nephritis.

**Etiology:**—Rheumatism and the tubercle bacillus are responsible for most cases, some following any of the other causal conditions of the acute form. It rarely arises after the 30th year, has been found post mortem in infants, and males are much more frequently affected.

**Symptoms:**—Many cases run a latent course and are never suspected; others are confused with accompanying diseases. The pericardial complication in valvular affections may prevent compensation or cause its early failure.

When there is no valvular disease present we may have palpitation, dyspnea increased by exertion, fast pulse, strong apex beat, cardiac enlargement; or the digestive disturbances due to venous stasis. The liver is enlarged, and cases presenting this feature are said by Babcock to be particularly resistant to treatment. Hemoptysis results from pulmonary engorgement, and edema may occur in the pulmonary tract. When the cirrhotic liver contracts, jaundice may appear, with ascites but no dropsy of the legs.

**Course:**—The course is variable. If the disease stops with permanent adhesion, this remains during life. Mediastinal implication eventually brings about a fatal ending.

**Physical Signs:**—If the adhesions are confined to the heart, there may be no signs discoverable. In mediastinal cases the adhesions alter the form and position of the heart, which pulls on the parts on which it is adherent, causing retraction of the chest-wall during systole. This is best seen while standing behind the patient and looking down at the chest, the patient holding his breath for the moment. Broadbent's sign is systolic retraction of the tenth and eleventh intercostal spaces below the inferior angle of the left scapula. An important indication is fixation of the apex, the beat of which does not alter its position with change of posture. Kussmaul's sign is swelling of the veins during inspiration; Friedreich's sign collapse of the veins during diastole.

On placing the hand over the apex a sudden shock is felt with the diastole. Palpation may also reveal the pulsus paradoxus, strong inspiration lessening the force and volume of the pulse or causing it to intermit, the usual strength and fullness being regained towards the close of expiration. Palpation may also determine fixation of the apex, and the condition of the liver. Percussion determines the degree of heart enlargement present. The increase of the dull area upward and to the left is significant. Fine friction sounds may be present at the edges of the dull area, persisting

while respiration is suspended. Perez' sign is a creaking heard over the body of the sternum when the arms are raised and lowered.

**Diagnosis:**—If no adhesions exist, we rely on percussion and a careful study of the circulation. In mediastinal cases, the signs described usually suffice. We may suspect pericardial adhesion in all cases of rheumatic valvular disease, especially if the liver is firmer and not smaller than in health; or if ascites develop without alcoholism. In Laennec's cirrhosis there is a history of alcohol, malaria or syphilis; in pericarditis, the history of the casual malady, and of acute pericarditis. In the former ascites develops before anasarca; in this edema may come first. No heart disease exists in Laennec's cirrhosis, nor are there signs of adhesion of the heart.

When the sac is distended by fluid, we find evidences of the pressure exerted, unless the effusion has occurred latently: Here we must depend upon the physical signs.

**Prognosis:**—Adhesion occurring alone, if it does not seriously interfere with heart-action, need not shorten life. Occurring with chronic valvular disease the prognosis is rendered worse. General adhesion must interfere seriously with circulation. Mediastinal disease tends to spread. Dropsy usually indicates the nearness of death. Venous engorgement is unfavorable as are hypertrophy and dilation when marked.

**Treatment:**—Intercurrent rheumatism or other disease must be promptly and effectively treated. Apart from this the indication is to delay the progress of the malady, especially as regards the trophic changes in the heart. The patient must be taught to live under the rule of his physician. The management of a lame heart will be so fully considered under the head of valvular disease that we will not repeat it here. Portal congestion requires care in arranging the diet, and periodic catharsis. Possibly some part of the organized fibrinous deposit may be removable by the continued administration of thiosinamin. One grain of this may be given three or more times a day for months. Heart tonics and other remedies should only be given when specially indicated.

## HYDROPERICARDIUM

This term designates the effusion of serum into the pericardium, not from inflammation but as a part of general dropsy. The serous surfaces may be edematous or unchanged. The quantity effused may reach several pints.

**Etiology:**—The cause is that of general dropsy. Occasionally local conditions may be present, such as thoracic tumors compressing the veins. It may occur suddenly in scarlatinal or chronic nephritis.



**Symptoms:**—We usually have accompanying effusions in the pleura and general dropsy. Respiration is embarrassed and the circulation may be impeded by any local cause of the dropsy, or by the distention of the sac; dyspnea may be extreme, the veins engorged, the arteries contain little blood, the pulse weak, rapid, irregular and of low tension. Cyanosis is usual. An effusion rapidly poured out causes more distress than one occurring latently.

**Physical Signs:**—Inspection may reveal evidences of local obstructive disease with prominence of the cardiac region, the apex beat absent. Palpation shows absence of the cardiac impulse, and possibly, some distention; percussion reveals the characteristic triangular dull area but the margins are lost in the pleural dullness, except at the apex under the manubrium. Auscultation shows the heart sounds weak, muffled or inaudible.

**Diagnosis:**—This may be simply inferential unless the pleural effusion is first removed, when it is self-evident.

**Prognosis:**—The incurability of the causal disease, and the fact that hydropericardium occurs in the later stages, indicate the seriousness of the prognosis.

The treatment is that of the primary disorder; tapping being rarely justifiable.

## HEMOPERICARDIUM

Rarely, blood is effused into the pericardium independently of inflammation, distending the sac according to the quantity effused. Rapid hemorrhages are smaller because the patient dies speedily. If death is delayed, the blood coagulates. The hemorrhage may occur from injury, rupture of the heart, aneurism, or a coronary artery. Wounds may occur from without, from crushing injuries to the chest or from a fractured rib. If the hemorrhage occurs slowly from a small wound, symptoms gradually supervene of heart-weakness with anemia, a sense of oppression, anxiety, prostration, dyspnea, pallor, cyanosis, cold extremities and clammy sweating. The pulse is weak, rapid and irregular. If the hemorrhage be free, the symptoms are of sudden shock, the patient dying speedily in collapse. The more rapidly the blood is effused the quicker death supervenes. Physical signs show the presence of blood in the pericardium. Diagnosis is only possible when the hemorrhage occurs very slowly. We have then the indication of the causal disease or injury, the sudden development of the malady, with evidences of hemorrhage, shock and collapse.

In traumatic cases the prognosis depends on the injury. The treatment is usually surgical. Sometimes it has been possible to lay open the sac,



find and close the bleeding artery. Medical treatment can only be applicable in the rarest of instances. Naturally it should consist in the administration of glonoin for cerebral anemia, atropine to divert the blood to the surface and away from the bleeding orifice, and strychnine to sustain the vital forces. In some cases the intelligent use of these remedies may give time for surgery to save life.

### PNEUMOPERICARDIUM

In extremely rare instances, gas has been found in the pericardium, usually with pus. The gas may enter through an orifice, or be formed in the sac. It may come from outside the body, the digestive canal, or the lungs. Gastric ulcers occasionally open the pericardium. The symptoms are those resulting from sudden distention of the sac. There may be shock, pallor and profound depression. Percussion shows the cardiac dullness replaced by tympanitic resonance. If fluid is present we have dullness in the dependent portion and tympanites above it, the two altering their location with changes of posture. Auscultation reveals splashing sounds, sometimes metallic tinkling.

The prognosis is serious but not hopeless when surgical intervention is applicable. If the sac is not infected, the gas may be absorbed. Sudden distention may cause fatal shock. The treatment consists in combating shock by the administration of glonoin, atropine and strychnine in full doses, hypodermically, or else absorbed from the mouth. Heat should be applied externally. Further than this the treatment is strictly surgical.

### PERICARDIAL TUBERCULOSIS

The acute form resembles ordinary acute pericarditis, and can only be distinguished by the microscope. The effusion has, however, a greater tendency to be hemorrhagic. Caseation is common, calcification rare. Acute cases may terminate in the chronic form or the disease may be chronic from the outset. The attack may be primary or secondary to tuberculous developments elsewhere, especially in the bronchial or anterior mediastinal glands. The affection is most common between the ages of fifteen and thirty, the range, however, being as wide as human life.

Tubercular pericarditis is generally latent. If it causes acute inflammation, the symptoms are those already described, pain, fever, palpitation, friction and the effects of pressure. There is nothing distinctive of this form in the physical signs. The diagnosis may be inferred from the existence of tubercle elsewhere. The prognosis is not very serious, yet

the affection is one more burden for the patient to sustain. The treatment is that of tuberculosis in general, and of pericarditis in particular.

**Pericardial Syphilis:**—This malady is excessively rare, but tertiary forms have been described. When it does occur it accompanies syphilis of the cardiac muscle. The disease is limited to the cardiac layer and appears as gummata or indurations, the latter more common. The muscular tissue underneath is likewise affected. The morbid process ends in the formation of cicatricial tissue; adhesion sometimes occurs. The malady runs a chronic course. The symptoms are obscured by those of syphilis in the heart muscle or elsewhere. Very rarely a friction sound may be detected, or the sac becomes distended with effusion. The diagnosis can scarcely be made during life; the prognosis is good; the treatment, that of syphilis.

**Pericardial Cancer:**—Primary cases are extremely rare; secondary invasions occur in cancer of the mediastinum, stomach or esophagus. Either carcinoma or sarcoma may occur. Some effusion is always to be found in the sac, especially hemorrhagic. The symptoms are—those of the primary growth. There is nothing distinctive in the physical signs, and the diagnosis is rarely possible. The treatment is that of cancer.

## II. DISEASES OF THE HEART

### ACUTE ENDOCARDITIS

Two forms of this disease are described, the simple and the malignant. The endocardium may become inflamed during fetal life, the right heart being then affected. After birth the attack is usually on the left side.

The attack commences with cloudiness of the membrane, on which a swarm of micro-organisms has doubtless settled. The disease generally begins on the valves, especially the mitral, at the margins. The membrane becomes thickened, with serous infiltration, erosions or lacerations. These are usually at once covered by a deposit of fibrin from the blood, which projects above the surface forming vegetations. Under this the process of repair goes on, the endothelium is reproduced; the fibrinous deposit continues and forms warty or polypoid growths. These may be re-dissolved by the blood, or broken off and be carried into the current until arrested as emboli.

The malignant or ulcerating form is due to more intense infection. It may result in vegetations, suppuration or ulcer. The destruction of



tissue is much greater than in the simple form. If emboli are carried into the blood they give rise to septic processes where they lodge. Valvular aneurisms or perforations may form, with consequent leakage. Ulceration may extend to the papillary muscles; perforation may unite several of the heart cavities or the right auricle and the aorta. If abscess forms in the heart-muscle the contents are discharged into the circulation. The simple form is frequently unnoticed, until after the lapse of years when the lesions it produces give rise to further changes.

**Etiology:**—Both forms are bacterial; malignant endocarditis being usually secondary to infectious disease elsewhere. The streptococcus pyogenes of erysipelas is common; also staphylococci pyogenes aureus and albus, micrococcus lanceolatus, gonococcus, and the bacilli of typhoid fever, diphtheria, influenza and tubercle. Several bacteria have only been found in endocarditis. Malignancy may be determined by the virulence of the microbes, their excessive number, or the low resisting power of the patient.

The simple form most frequently follows rheumatism, of which it may be the first manifestation. It is especially apt to occur with a first attack, if severe and multiple, in young patients. The causal influence of chorea is generally admitted; but whether this is the case when rheumatism is absent, is still questioned. The eruptive diseases and typhoid fever give rise especially to the malignant form, as also does gonorrhea. Either form may accompany pneumonia. Septic infections favor the occurrence of the malignant form and tonsillitis or a boil has been followed by this affection. It has been attributed to gallstones, cancer of the pylorus, diphtheria, rheumatism and pneumonia.

**Symptoms:**—Occurring in rheumatism, simple endocarditis may only be recognized years afterwards, when chronic valvular disease has reached a troublesome stage. But sometimes during an attack of rheumatism a rise of fever occurs without the involvement of a newly-affected joint, or there may be pain about the heart, oppression or discomfort, palpitation, and especially a subjective sense of dyspnea, sometimes termed "air hunger." The dyspnea may be continuous or paroxysmal. Sometimes there is marked general disturbance, fever alternating with perspiration, the pulse irregular and disturbed, indicating a disease on the border between the simple and malignant forms. If embolism occurs the symptoms are those of infarction of the kidney, bowel or brain. If small the symptoms may be unnoticed; or they cause sudden sharp pains, chill followed by fever, and disturbance where the embolus lodges. If in the kidney the urine may contain blood, albumin or pus. In the brain they cause corresponding paralysis.



The course varies with the intensity of the infection. The simple rheumatic form may end in complete recovery, but usually some permanent impairment of the valve results.

**Ulcerative Endocarditis:**—We have here to deal with an inflammation presenting symptoms of general sepsis, usually ending in death. The general symptoms may predominate, such as the fever of pyemia, slight rigors, profuse sweating, profound and rapid prostration, anemia, emaciation, anorexia, diarrhea, the tongue brown and dry, tympanites, stupor or low delirium, and enlargement of the spleen. The pulse is moderately fast, remarkably weak and low in tension. The heart may show no signs whatever, or simply slight dilation, with a faint soft systolic apex or basic murmur. The condition resembles typhoid fever.

Sometimes the fever assumes the remittent or intermittent form, running a very mild course. In other cases the type is irregular, not very high but the anemia is rapid, the heart symptoms not prominent. Then again we may have rigors, sudden and lofty jumps of the temperature followed by corresponding drops, with sweating resembling malaria, but without its typic periodicity. In other cases the fever type changes from week to week, but the pulse is always feeble and depression continuous. Sometimes the local disease is shown by emboli in the skin or elsewhere. Small emboli in the skin cause petechiæ. Still other cases resemble acute hemorrhagic nephritis, with more fever. A special group of cases present less marked general sepsis, but a peculiarly soft pulse, too rapid for the fever, with dyspnea, cyanosis and enlargement of the liver and spleen. The heart may show increasing weakness, slight enlargement and possibly a soft murmur.

The course of ulcerative endocarditis varies. Death may occur in a few days, or life be prolonged for months, sometimes with intervals of improvement. Death occurs from weakness of the heart or injury due to ulceration, from edema of the lungs, infarctions or exhaustion.

Inspection and palpation may aid recognition of an old lesion, or the study of the pulse. Percussion reveals the dilatation or hypertrophy present, and the part of the heart so affected. Auscultation may detect changes in the character and relative intensity of the heart-sounds. Any aberration from the normal sounds will be found to increase if careful daily examinations are made. Presystolic murmurs are rare in acute endocarditis unless a mitral leak has previously existed. Systolic murmurs at any of the valves may be accidental. The general symptoms may be due to the rheumatism. If the inflammation does not affect the valves, the diagnosis can only be made when embolism occurs. Pericarditis is a much more painful disease; the friction murmur does not

usually coincide with a heart-sound, and the occurrence of effusion is significant. Pernicious anemia may closely simulate acute endocarditis without embolism. An examination of the blood may decide the diagnosis. It is sometimes impossible to distinguish ulcerative endocarditis among the symptoms of general sepsis. In other cases the valvular indications are marked. The presence of a causal disease, however, generally gives a reliable indication, especially if infarctions occur. Sometimes the only symptoms pointing to the heart-disease are weakness of the pulse and muffling of the heart-sounds. In infectious maladies absence of the usual leucocytosis points to malignant endocarditis.

When we have satisfied ourselves as to the existence of acute endocarditis, we should then ascertain the cause, determine the characteristics of the fever, examine the blood and the urine, ascertain whether hemorrhages into the skin or from the mucosa have occurred, search for embolisms, note whether the spleen is enlarged, and thus distinguish between the simple and ulcerative forms, that an intelligent prognosis may be made.

Typhoid fever is confused with ulcerative endocarditis more frequently than any other disease. In typhoid fever we have a typical temperature curve, a pulse slow in proportion to the fever, early enlargement of the spleen, typical rose spots and stools, bronchitis, early epistaxis and late intestinal hemorrhage, and finally the Widal test, which is a certain means of distinguishing.

**Prognosis:**—Benign cases may completely recover, but more frequently leave chronic disease. Mitral disease is less dangerous than aortic. Rapid dilatation of the heart indicates myocarditis, which is grave. An acute attack superadded to chronic disease of the valves is a serious occurrence, since it is usually malignant; and at any rate it hastens the progress of the cardiac malady. Embolisms of the brain cause paralysis; septic emboli are the more dangerous. The occurrence of hematuria is a bad indication.

**Treatment:**—The first duty is prophylaxis. The treatment of the original infection should be prompt and effectual, especially as regards the care of the sick-room. Children susceptible to rheumatism should be carefully protected against it, and frequent examinations made of the heart. The slightest inflammation of the tonsils should be promptly and vigorously subdued. Babcock lays great stress on securing as much rest to the heart as possible during rheumatism and other infectious diseases, relieving the valves of strain as much as possible. This is especially important in the less acute attacks when the patient is usually unwilling to keep quiet. Confinement to bed is especially necessary when endo-



carditis appears, as inflammation is increased by exercise. Digitalis does harm by increasing systolic strain. Aconitine and veratrine, in full doses, would be likewise harmful but in small doses they are beneficial by increasing the inhibitory control over the heart, veratrine being also a direct tonic to its muscular tissue. Very small doses, gr. 1-134, of veratrine may be given with advantage every two to four hours. Cold over the heart has been strongly urged, as increasing the force of the heart's contraction as well as subduing the local inflammation. Babcock prefers hot applications, claiming they are more stimulating. Counter-irritation relieves pain.

We have as yet no data concerning the treatment of endocarditis of either form with modern antiseptic remedies; we are, therefore, limited to the application of those general rules which have been established by the study and application of the active principles. We therefore initiate treatment by completely clearing the alimentary canal and thus relieving the patient from the depressing effects of fecal toxemia. Give calomel gr. 1-6 every hour for six doses, followed by an ample saline cathartic, and then enough of the sulphocarbolates to render the alimentary canal approximately aseptic. We may meanwhile seek to cope with micro-organisms in the blood or the tissues, by saturating the body as quickly as possible with calx sulphurata.

Beyond this the treatment is strictly symptomatic. The above remedies are indicated in all infectious diseases, and it may well be that in some cases their action may suffice to enable the patient to cope with the malady himself. We cannot mistake, however, in affording him the powerful aid of the leucocytosis developed by nuclein. Of this the standard solution should be given to the full limit of its action in stimulating leucocytosis. Our experiments have shown that for this purpose the average adult daily dose is sixty minims. This should be given in divided doses, hypodermically or dropped upon the tongue, to be absorbed from the mouth and not subjected to the action of the gastric juice.

As to the symptomatic treatment, we will simply mention the following: For pain and restlessness, codeine, cannabin, iodoform and camphor monobromide; for fever, aconitine, veratrine and gelseminine; for insomnia, camphor monobromide; for general and heart weakness, strychnine or brucine; for threatened collapse, atropine; for restlessness, zinc valerianate; weakness of the right heart demands the addition of convallamarin; cactus is a good, mild heart-tonic. Digitalin is usually harmful, and the venous engorgement which specially indicates this agent is not a feature of this disease.

The diet should consist of small quantities of the richest nutrition to be found, predigested, and alternated with small cups of strong coffee,



the latter an admirable heart-tonic itself. Failure of the urine should be met by the injection of normal salt solution into the colon.

In the ulcerative form, it is especially necessary to apply the general treatment above described. The usual treatment offers no encouragement whatever. We are therefore fully justified in laying it aside for anything which appears to deserve a trial, and the evidence in favor of the active principle method in the treatment of other infective processes warrants the hope that its application here may prove at least somewhat more successful than the despairing suggestions made in the text-books. Sansom is quoted by Babcock as reporting one case in which a patient improved so much under sodium sulphocarbolate that she left the hospital. She returned and died of a fresh attack in ten months. It is not said what was her treatment during the interval of the second attack. Babcock attributes the benefit from such remedies to their local antiseptic action in the intestines, since as he says, "Fermentative processes and diarrhea, as shown by fœtor of the discharges, are very common within the digestive tube of patients suffering from sepsis. Such a condition may not only intensify the pyrexia and other symptoms of infection, by itself setting up an infection of intestinal origin, but it prevents the proper digestion and assimilation of nourishment. If now this putrefactive fermentation can be prevented by intestinal antiseptics, the patient's nutrition will improve and his tissue resistance be augmented. It is possible, perhaps, by having this additional enemy thus removed, the system may be able to cope successfully with the primary invader."

The early and efficient use of antitoxin in diphtheria is the most effective means of preventing the development of malignant endocarditis; and should also be employed although with less hope of success, as a means of treating this malady. The other serums are much less satisfactory. We must, however, call attention to the importance of emptying and completely disinfecting the primary focus whence the infection is derived, whenever it be possible; even though this may be comparatively small, the most malignant infective process will be found there.

### CHRONIC ENDOCARDITIS

The fibrinous deposits of acute endocarditis are largely absorbed, but the surface remains roughened. The tissue of the valve is infiltrated with new connective, and as this becomes organized it contracts, causing deformity of the valves and consequent imperfection in their function.

In arteriosclerosis the endocardium, especially of the aortic valve, is involved. The mitral valve may also be affected. The sclerosis is here primary.

The deformity of the valve may result in imperfection allowing part of the blood it should intercept to flow backward, or adhesion of the edges of the valve leaflets may narrow its orifice so as to obstruct the onward flow of the blood through it. The first constitutes a leak, allowing regurgitation; the technical designation of the lesion being insufficiency. The second is known as "stenosis". The two often coexist, the valve being partly obstructed and also leaking. Obstruction may be in part due to thickening and stiffening of the valves, and to the remains of vegetations which have become organized. Insufficiency causes an abnormal quantity of blood to fill the cardiac chamber behind the leaky valve, inducing dilatation and hypertrophy of the muscular fibers, by which the blood is forced through the orifice and the circulation maintained. Stenosis leads to hypertrophy without preliminary dilatation, the cavity contracting as the supply of blood is not increased. The chamber in front of the defective valve, receiving a smaller supply, becomes atrophied and contracted. The blood supplies to the arteries being reduced in quantity they contract, the veins are overfilled and the capillaries dilated with venous blood.

Changes in the myocardium and pericardium usually accompany or follow.

**Etiology:**—Sclerosis may be due to age, gout, nephritis, arteriosclerosis, or local strain. The tendency to it is probably hereditary. Old age—physiologic rather than chronologic—is denoted by sclerosis. Sedentary life with a large consumption of animal food and alcohol determines the whole group of maladies causative of this process, whether the direct exciting cause be gout, cirrhotic nephritis or arteriosclerosis. The *modus operandi* is supposed to be the induction of strain, mechanical, long-continued, by abnormal vascular tension. Constipation, indigestion, auto-toxemia, afford elements of an irritant nature to the blood that should not be ignored. Very laborious occupations contribute to the strain. Tobacco and syphilis are credited with causal influences, which seem less obvious, though the latter may affect the heart muscle and the endocardium directly. The most important cause, at least in the young, is rheumatism. The original attack may be overlooked and the disease progress unsuspected for years, until the failure of compensation first directs attention to its existence. Mitral stenosis is the form most frequently arising from this cause.

**Symptoms:**—When exact compensation exists there are no subjective symptoms. Mitral affections present marked venous congestion, while aortic imperfections display the evidences of insufficient arterial supply, both manifesting these two elements in varying proportion. Some of



the later manifestations are due to the interference with digestion, the altered circulatory conditions, the pulmonary engorgement, complications and intercurrent maladies to which the heart lesion may open the door, the occupation, the assumption of marital relations, pregnancy and lactation, embolism and thrombosis.

The cardiac cachexia is at least partly due to chemical changes in the blood. It displays debility, anorexia, indigestion, and often indisposition as well as inability for physical and mental labor. Palpitation and attacks of pain in or about the heart are common, as well as irregularity of cardiac rhythm. These occurring in individuals in whose hearts no lesion can be detected are possibly of toxemic origin, but the fact that the manifestations occur in the heart stamps that organ as a point of low resisting power, hence liable to disease.

### MITRAL LEAK

Regurgitation being a symptom consequent upon the lesion, that term does not seem appropriate as a designation for the malady. While we may term it incompetence or insufficiency, the word "leak" is good Anglo-Saxon, accurately descriptive of the lesion and conveying instant apprehension of the true difficulty to the mind of any student.

As the left ventricle contracts part of its blood is squeezed back into the auricle. The trouble is due generally to deformity of the valve leaflets. When the cavity is enlarged the valves usually elongate so as to close the orifice, so that imperfection from this cause is infrequent.

**Pathology:**—The leaflets become thick or rigid, curl up, or the chordæ shorten till the valve can not close. Remains of vegetations may be found on the margins, sometimes calcified. These cause stenosis also. The calcareous deposits may be quite large. The blood flowing back into the auricle meets the oncoming blood delivered by the pulmonary veins, overdistending the left auricle. This stimulates its walls to increased action, which induces hypertrophy. If this be exactly sufficient for the need, the circulation is maintained and this condition of equilibrium may endure to the full expectancy of life. But if the leakage be great, the auricle does not completely empty itself and an accumulation of blood takes place in it. This obstructs the outflow of blood from the pulmonary veins, which, they becoming congested, hinders the delivery of blood from the pulmonary capillaries, which in turn become engorged. This offers an obstruction to the outflow of blood through the pulmonary artery, and into it from the right ventricle, which in turn becomes hypertrophied to meet the increased resistance. This is the point where com-



pensation is usually established, and as a rule this is sufficient to force the blood through the entire vascular apparatus into the aorta, compensating completely for the defect and maintaining the circulation. But this is done at the cost of increasing the pulmonary engorgement, changing it from a passive congestion to an active hyperemia; and whatever symptoms are relieved, the patient suffers continuously from the pulmonary engorgement. Hyperplasia of the pulmonary connective results in time, while catarrhs, hyperemias and pulmonary edemas are frequent transitory features. When the limit of compensation has been reached the right ventricle yields to the strain and dilates. This condition rapidly increases as the blood-pressure within the ventricle becomes greater; the tricuspid valve is unable to fill the gap and blood regurgitates into the right auricle; this becoming dilated, offers an obstacle to the influx of blood from the venæ cavæ, and the entire venous system becomes passively congested. The engorgement is most markedly manifested in the liver, which enlarges, and the entire portal system to which the obstruction is transmitted in turn becomes engorged with blood, the spleen enlarging, the stomach becoming congested as well as the intestines, interfering with the digestion and absorption of food by the direct back-pressure, and giving rise to catarrhal conditions, diarrhea, hemorrhoids, ascites, etc. The entire venous system is congested, and dropsy with cyanosis supervenes. All the viscera in time show morbid alterations due to this disturbance of the circulatory conditions. The dropsy begins in the lower extremities and extends upwards.

Some hypertrophy occurs in the left ventricle, which is attributed to the increased quantity of blood discharged into it by the auricle, owing to the occurrence of excessive hypertrophy of the right ventricle. The left ventricle also dilates in due time, the muscular tissue having become flabby, the fibers smaller, and containing brown pigment granules. The whole heart is therefore enlarged in time, especially the right ventricle.

**Etiology:**—The causes are those of chronic endocarditis. This is the most frequent of all defects of the heart valves, especially in the young, in whom rheumatism, chorea and the infectious fevers are most frequent.

**Symptoms:**—If compensation is exact, there are no subjective symptoms. Many unsuspected cases are detected, when for any reason the patient undergoes an expert physical examination. Some persons apply to the physician on account of the digestive affections, constipation, pains about the heart, or palpitation. Women may display nervousness or anemia, short breath or palpitation after exertion. Rarely the pain about the heart is severe, even amounting to angina. Dyspnea is a common symptom when compensation has become imperfect, and is manifested

after continually slighter exertion. The pulmonary engorgement renders these patients very liable to catarrhal attacks, which generally settle into the chronic form, worse in cold weather. Patients often complain of the sensation of a hair in the larynx. Hemoptysis is very common in the later stages when any unusual exertion, by increasing the pulmonary congestion, may bring on coughing. Edema of the lungs may occur.

As long as the right ventricle sustains the circulation, this comprises the symptoms usually manifested. If the hypertrophy be excessive, cerebral hyperemia results, and apoplexy may occur, cerebral or pulmonary. When the right ventricle has given way and the blood is backed up into the general venous system, we have enlargement of the liver, with dull soreness, the appetite is lost, nausea is easily induced and gastric catarrh arises, with its innumerable phases. Intestinal catarrh also follows with tympanites, diarrhea, intestinal hemorrhages, hemorrhoids and a large variety of symptoms due to intestinal engorgement. Great thirst is common. Sometimes the appetite is excessive; the food not being digested, absorbed and assimilated, tissue hunger is not satisfied. The pelvic organs becoming congested menstrual troubles arise, the flow being sometimes but not always excessive. Renal disorder is manifested by pale, scanty urine, with albumin and casts after dropsy has commenced. The liver is tender, and the intestinal catarrh extending into the gall-passages causes a degree of jaundice; the cheeks show a dark flush, the lips appear as if stained by mulberries; the cutaneous veins are prominent; and after the patient has been on his feet during the day he is apt to complain of his shoes being tight, as the ankles swell towards evening. By morning this has disappeared; but as the dropsy increases edema may be detected along the back or other dependent portions. Shortness of breath increases and occurs after slighter exertion; uncomfortable sensations are felt in the region of the heart, differing from the sense of oppression in the chest experienced while the disease has not progressed beyond compensatory hypertrophy of the right ventricle. A notable symptom is the effort required to talk while walking. Perspiration occurs readily and fatigue is quickly induced. Sometimes the patient becomes drowsy after meals or when sitting quietly. These patients find it especially difficult to endure a close, hot room. The sleep is disturbed by unpleasant dreams and nightmares; or the patient drowsy by day is wakeful and restless on lying down. Headaches may be due to active hyperemia while compensation is still perfect, and to passive congestion later. As compensation subsides dropsy creeps up, reaching the abdomen and invading the serous cavities, the peritoneum, pleura and pericardium, interfering markedly with respiration and greatly increasing the patient's discomfort.



The legs become cool, smooth, white and shining, bed-sores may form, or the skin may break. The slightest rupture or wound is apt to be followed by erysipelas. Feeding becomes more and more difficult; the cerebral congestion gives rise to continuous dull headaches, with irritability, and sometimes a typhoid condition; the patient grows less and less able to obtain comfort with the head low and gets in the habit of spending the day and night in a chair; exercise growing more difficult on account of the short breath, the patient is able to walk only with a nurse on each side sustaining her, and slipping the feet along the floor inch by inch, without raising them. Any change of posture becomes of increasing difficulty. The patient when in this condition may die at any moment, the heart stopping at any exertion or emotion. The abrupt entrance of a friend into the room may cause the feeble fluttering of the heart to cease. Finally such a patient will be found dead in the chair, the candle, burnt to the end, having flickered out.

If nephritis enters into the case, as an original cause or as secondary to the loss of circulatory equilibrium, we may have uremic symptoms intervening. Sudden paroxysms of dyspnea occur, generally worse at night; headache and nausea are more common, and intercurrent serous inflammations occur. The dropsy is more difficult to treat. Edema of the lungs, brain or elsewhere may appear swiftly. Excepting when the kidneys are diseased, cardiac asthma is not common. If ascites occurs independently of general dropsy, it is most generally due to adherent pericardium. Embolism may occur during or after an intercurrent attack of acute endocarditis; the symptoms varying with the organ to which the embolus is carried; in the kidney it causes hematuria; in the brain it usually enters the left middle cerebral artery, causing aphasia or paralysis of the right side; in the hepatic artery it causes acute jaundice and atrophy; in the spleen a sudden sharp pain with swelling and tenderness; in an extremity it causes pain, pulsation ceases in the artery below it and the limb becomes weak, numb and cold; gangrene may follow, especially in the legs. Emboli deposited in the lung cause infarctions, with pain and hemorrhage. If the pulmonary artery is blocked, death occurs quickly.

**Physical signs:**—Inspection recognizes the evidence of capillary congestion in the face and lips, cyanosis later. In children the fingers club, the shoulders stoop, there is bulging in the region of the heart, and growth is stunted. Nothing of the kind is manifested in older patients. As the heart is hypertrophied its weight drags it down, and the varying hypertrophies displace the apex to the right or left. Epigastric pulsation indicates hypertrophy of the right ventricle.



Palpation shows a pulse of low tension, rapid but regular; until compensation weakens, when the pulse becomes deranged in rhythm and feeble. This is more readily recognized if the arm is raised. The degree of enlargement of the heart may also be estimated by palpation. A systolic thrill may be felt at the apex. The enlarged right ventricle may be felt pulsating at the epigastric notch.

Percussion shows the enlargement of the heart, under and to the right of the sternum, in right-sided hypertrophy; to the left, beyond the nipple, in left-sided enlargement. Auscultation detects murmurs replacing the normal sounds of the heart. In mitral insufficiency the murmur is heard most distinctly at the apex, with the first sound of the heart, when the ventricle is contracting and some of the blood regurgitating through the imperfectly closed mitral valve. The existence of such a murmur is not alone sufficient evidence of mitral imperfection, as the murmur may be accidental, or due to abnormal vibration of the valves. Any lesion of the valve which will cause a murmur will also give rise to such conditions as we have described, at any rate to enlargement of the left auricle and some congestion of the lungs. As these valve lesions are frequently multiple there may be a presystolic murmur at the apex, indicating a degree of obstruction also; or other murmurs heard at the base may show involvement of the aortic valves; while in due course of time the tricuspid and pulmonary valves also contribute their signs. Sometimes the mitral sound is more distinct over the tricuspid area, which shows the importance of considering the concomitant symptoms as well as the murmur. The murmur may be heard more distinctly while the patient is still panting after exercise. Sometimes it is best heard when the patient is lying down. The organic murmur is generally transmitted widely and toward the axilla, while accidental murmurs are much more contracted. The pulmonary second sound is intensified.

**Diagnosis:**—When the disease has progressed the diagnosis is easy. Late in the course of the malady it may be difficult unless the history is clear. The physical signs already given suffice, when in harmony with the history and the original cause has been ascertained. Being familiar with the course of the malady, the extension of the disease process may be estimated, and the prognosis deduced. This depends on the original cause, the secondary effects, the condition and persistence of compensation, and the presence of complications. Sclerosis is progressive. A large leak is more dangerous than a small one. Excessive over-compensation brings its own dangers and is less enduring than a compensation just sufficient for the defect. The age, occupation and tractability of the patient are to be considered.

Sudden death is not a feature of mitral disease, unless the heart muscle is degenerated. Death from embolism is rare. Usually the case is prolonged with constantly increasing distress, until death is welcomed by the patient and the friends.

## MITRAL STENOSIS

The lumen of the valve is lessened by adhesion of the margins of the leaflets, which may extend almost to the apex, leaving only a buttonhole orifice; or the opening may be occluded by inflammatory products, by which the valves are distorted. Stenosis without insufficiency is almost unknown. The narrowing of the valve necessitates a more rapid flow of the blood through it and this induces hypertrophy of the left auricle. Dilatation of the auricle only occurs when its hypertrophy has become insufficient to force all the blood through the continuously narrowing orifice; hence, hypertrophy of the auricle precedes dilatation in mitral stenosis, the converse being the case in insufficiency. Meanwhile the ventricle, illy supplied with blood for its work and its nutrition, becomes contracted and atrophied. The same evidences of obstructive circulation follow as in mitral leakage, the blood being backed up in the pulmonary veins, pulmonary capillaries and pulmonary artery to the right ventricle, upon whose hypertrophying walls the patient must depend to sustain the circulation. This is, however, more difficult than in mitral insufficiency. The myocardium becomes atrophied, and the same congestive effects are manifested throughout the body as are described in the preceding chapter.

**Etiology:**—We need not repeat here what has been said in the preceding chapter, since the same causes apply; but stenosis is always due to structural defects, acute inflammation inducing incompetence. If in such cases stenosis develops it is at some subsequent period. Rheumatism is therefore the most common cause and the malady is progressive. It more frequently depends upon the slighter attacks of rheumatism, which are less likely to receive due attention and treatment. Tuberculosis has also been assigned as a cause of this malady. Syphilis and gout are causes of the sclerotic form occurring in advanced years. This defect is much more frequent in females; so far as the rheumatic endocarditic form is concerned, the sclerotic form being equally common in both sexes.

**Symptoms:**—The course and symptoms are practically identical with those of mitral leakage. Stenosis is less likely to remain at a standstill for many years. Occurring in young children, development, mental and bodily, is apt to be imperfect. In adults the circulation is weak, the



extremities cold, the patient anemic and very sensitive to cold. Digestive and menstrual troubles are common in women, with constipation; the urine scanty and concentrated. Bronchial catarrhs and acute edema of the lungs are more common than in insufficiency. Dyspnea on exertion also occurs early; in fact, when we realize that the pressure exerted in the pulmonary circulation is even greater than it is in mitral leakage, the predominance of pulmonary symptoms is readily appreciated. The sense of fullness and oppression in the chest is usually marked; patients complain of vertigo on suddenly arising after lying down. Sleep is much disturbed. Pulmonary hemorrhages and hemoptysis are common; in time the right ventricle gives way, the tricuspid valve opens and venous stasis extends through the entire venous tract.

The ending is similar to that in mitral insufficiency. The physical signs in general resemble those described in the last chapter: Palpation may detect a thrill at the apex, preceding the ventricular systole; resembling the purring of a cat, it is known as *fremissement cataire*. The systole following is short and sharp; epigastric pulsation is usually pronounced. The pulse is weak and slower than in insufficiency. The degree of irregularity probably depends upon the condition of the heart muscle. Occasionally there is a difference in the two radial pulses, the left being smaller. This is observed when compensation fails. Percussion shows evidence of enlargement of the right heart. Auscultation reveals the characteristic murmur. Babcock describes it as "a long-drawn bruit, following the second sound and ending in the clear sharp first sound." It is most distinct at the apex and is synchronous with the auricular systole. The murmur cannot usually be heard beyond a limited area, where the thrill is most plainly felt. Obstructive bruits are always rougher than those of regurgitation. This may be heard most distinctly when the patient is lying down, but in some cases the reverse is the case. This murmur is not uniform as heard at different times and conditions. Sometimes the bruit is very short; at others very long. The second cardiac sound and sometimes both sounds may be inaudible. The short, thumping first sound may be so marked as to permit a diagnosis to be made from it alone. The second sound is sometimes apparently double, when the heart is comparatively strong.

The diagnosis is usually easy. Stenosis is more common in females. The thrill followed by a short, sharp, systolic beat, the dullness indicating right ventricle enlargement alone, the rough low-pitched presystolic murmur, the double second sound, the marked pulmonary symptoms, the small weak pulse and regular rhythm, sufficiently distinguish this condition.



When the nature of the lesion has been diagnosed, we have to determine the stage of the malady's progress, the patient's resisting power and the other elements, from which we can form an estimate of the probable results. Repeated examinations at intervals will show the rate of progress to be expected. The prognosis is less favorable than in incompetence, the pulmonary congestion being greater and the malady more frequently progressive. The average duration of these cases has been estimated at ten years. Death results from progressive heart weakness, pulmonary complications and infarctions. In the last stages slight excitement or exertion may cause death. Acute pulmonary inflammations are common and fatal.

### AORTIC LEAK

Imperfection of the aortic valve permits a portion of the blood entering this vessel to flow back into the left ventricle when the artery contracts.

**Anatomy:**—The lesions found closely resemble those already described as appearing in the mitral valve. Sclerosis is more common in the aortic valve. The leaflets may be contracted or twisted, or their complete closure prevented by growths at the margin. We do not, however, find contracted chords. Ulceration may perforate a valve leaflet, or it may be ruptured during violent exertion. This is probably impossible unless the valve was previously weakened by disease. Stenosis coexists frequently but not always. As a first result of the imperfection the left ventricle becomes dilated by the double flow of blood into it. Hypertrophy follows and develops early, often greatly exceeding the need. The wall of the ventricle may become enormously thick, projecting into the cavity of the right ventricle. When the mitral valve becomes imperfect the symptoms already described as due to that lesion will be developed. The double hypertrophy thus occasioned increases the size of the heart enormously; this is known as *cor bovinum*, and one has been reported weighing six pounds. The force exerted by such a ventricle subjects the aortic walls to great strain, and sclerotic changes follow. When the valvular disease occurs in elderly persons with arteriosclerosis the hypertrophy is slight; as a result of the disease of the coronary arteries lessening their lumen and interfering with the nutrition of the heart, degeneration following.

**Etiology:**—Rheumatic cases occur in young males. The sclerotic form is also more common in males. Incompetence sometimes occurs from enlargement of the ventricle, stretching the basal ring to which the valves are attached. This may be occasioned by degeneration of the heart-muscle, aortic disease or mediastinal tumors compressing the aorta. Aortic aneurism is a frequent cause.

**Symptoms:**—When compensation is established the disease may remain at a standstill for years, considerable physical exertion being indulged in with impunity. The patient may be unconscious of the existence of a heart malady. Unless hypertrophy be pronounced, the arterial system is not well filled and anemia with innutrition results. This is exceptional. Some persons are affected with palpitation, or dizziness, especially after exertion. The hypertrophy, however, is usually great, and while it endures the aortic circulation is more than maintained, the brain is flooded with blood, and sometimes bleeding at the nose gives temporary relief. As the lesion increases we may have on the contrary an alternation of cerebral anemia and hyperemia, causing distressing vertigo and attacks of syncope. These patients lie with the head low; those with mitral disease with the head high. Digestive disorders are not so common as in mitral disease; but owing to the weak circulation and the small supply of blood patients suffer with a chronic dyspepsia, and any excess in diet brings quick retribution. Nor are the pulmonary symptoms present unless the mitral valve is also involved. There is apt to be pain about the heart, more marked than with mitral disease. The sclerotic type is especially grave as degeneration of the heart-muscle precedes the valvular lesion, and the nutrition of the heart suffers still further from an insufficient supply of blood through the coronary arteries.

Failing compensation is indicated by the weak, irregular and intermitting pulse. Pulsus intercurrents occurs. This increases as the difficulty grows greater; dyspnea, vertigo and syncope increase; sudden death may occur at any time; or symptoms indicating collapse, with dyspnea, cyanosis, an empty pulse and sense of impending death. Pulmonary stasis now occasions hyperemia and edema of the lungs, with hemoptysis. Angina pectoris is much more frequently seen with aortic than with mitral disease. These aortic cases may be divided into two groups; the younger, in whom endocarditis follows rheumatism or other infectious diseases; and the elderly, in whom it is part of a general vascular sclerosis. Hypertrophy only occurs in marked degree with the first class, and fails early. When compensation fails, however, in the second class, the end comes rapidly.

Inspection shows throbbing of the superficial arteries, with the powerful pulsations of the great left ventricle, which may shake the chest. The apex beat is displaced outward and downward; in elderly patients it may, however, be scarcely perceptible. Visible pulsation in peripheral arteries indicates excessive hypertrophy. This may also be seen in the retinal artery. Palpation distinguishes the powerful heart-beat. A presystolic thrill may be felt over the apex, a systolic and sometimes a diastolic thrill over the aortic valve. The peculiar pulse has been called the Corrigan,



collapsing, water-hammer, locomotive, and *pulsus alter et celer*. It is a powerful stroke, not sustained but subsiding instantly. The reason for this is evident from the mechanical conditions of the circulation. Sometimes the stroke is doubled. The arteries in the patient's fingers may sometimes be felt to pulsate while we hold his hand. Quincke's sign is the capillary pulse, best seen in the palm and beneath the nails, when the hand is warm or after rubbing the skin until it is red. At the margin of the red patch the heart's pulsations may be noted. Sometimes pulsation is visible in the superficial veins.

If the leakage is serious, a thrill may be imparted to the cervical and brachial arteries.

By percussion we judge of the heart's size. The enlargement of the left ventricle increases the dull area to the left and downwards, the apex becoming broader as dilatation supervenes. Aortic insufficiency causes a murmur replacing the second heart-sound, usually most distinct in the second intercostal space at the right margin of the sternum, or a little lower. Sometimes this murmur is heard most distinctly to the left of the sternum, in the space where the pulmonary valve is usually heard. The distinction is made by the history and symptoms, pointing unmistakably to disease of the aortic valve. Aortic sounds are most distinct after exertion and when the patient is standing, exceptionally when lying down. There is no special relation between the loudness of the murmur and the gravity of the disease. At the apex the first sound may be muffled, the second sound feeble. The second aortic sound may be faint or wanting. Double murmurs at this valve are frequent. Faint systolic murmurs may be heard over the carotid and subclavian arteries. Over the femorals a sharp snap may be heard synchronous with the first heart-sound. This disappears when the vessel is pressed upon by the stethoscope, being replaced by a murmur. A diastolic murmur may also be elicited, the double murmur known as *Duroziez's sign*.

**Diagnosis:**—Difficulty is not apt to be met except in case of the aged. The first importance must be given to symptoms denoting irregularity of the circulation rather than to the murmur. The prognosis depends upon compensation. When the disease has been caused by endocarditis, compensation may endure for many years; when this fails the prognosis is graver than in mitral disease. In cases due to degeneration compensation is briefer, and when once lost the progress is more rapid. The rare occurrence of stenosis is favorable. The sudden deaths occurring in heart disease are especially common in aortic maladies, the left ventricle stopping in diastole. There may have been vertigo, but usually not enough to warn the patient. Death follows some sudden effort. Such cases



are, however, exceptional; more frequently death is preceded by degeneration of the heart-muscle. Otherwise, the last stages resemble those of mitral disease.

## AORTIC STENOSIS

In most cases this disease accompanies the preceding form. The valve leaflets may adhere at their edges or vegetations and other growths may obstruct the lumen of the valve. The former may be congenital or due to acute inflammation. Sclerosis causes insufficiency as well as stenosis. The same may be said of vegetations. Sometimes the aortic ring, or the trunk of that vessel, becomes contracted; this is generally congenital. Whatever be the cause and form of the malady, it constitutes an obstacle to the egress of blood and this induces hypertrophy of the left ventricle. Dilatation follows hypertrophy, occurring as compensation fails. When the supply of blood to the coronary arteries is interfered with, the nutrition of the heart suffers and degeneration of its muscular fiber follows.

**Etiology:**—A few cases are congenital. Usually the disease is due to endocarditis in the young, or sclerosis in the aged.

**Symptoms:**—There may be none. When the obstruction is extreme we see the effects of a diminution of the blood-supply in general, innutrition and feebleness of function, as well as stasis behind the obstruction. Slight forms may exist for years unsuspected; even to old age following a life of average activity. At other times the patient is simply below the average of physical capacity; others are liable to fainting fits, vertigo or even convulsions. When failure of compensation begins the left ventricle dilates, the pulse grows feeble and irregular, mitral insufficiency follows and the circulation is backed up through the lungs, as in primary mitral disease. The right ventricle enlarges in turn, and the symptoms of venous engorgement already described are manifested. Mitral leakage relieves the engorgement of the left ventricle and checks its dilatation.

In the early stages the patient is pale; cyanosis follows mitral implications. The left ventricle hypertrophy displaces the apex beat downwards and outwards; the heaving pulse of the enlarged ventricle is less marked than in aortic leakage. In very fat persons palpation may not detect it. When the ventricle dilates this heave is weakened. A thrill may often be felt in the aortic region with the ventricular systole; the pulse is small and weak, slower than normal, until degeneration occurs in the heart-muscle. The sphygmographic tracing shows an oblique ascent, rounded summit, gradual descent and indistinct secondary waves. The cardiac dullness is increased downward and outward. The usual signs of right

ventricle enlargement follow late. The first sound at the apex is dull and muffled; the distinctive murmur is heard in the aortic area, in the second intercostal space to the right of the sternum, with the first heart sound. It is usually quite distinct and may be heard along the course of the great arteries.

**Diagnosis:**—The characteristic murmur, with hypertrophy of the left ventricle and weakness of the aortic second sound, usually suffice for a rheumatic person under forty years of age. Sclerosis occurs after mid-life; the arteries generally are stiff and tortuous, the aortic second sound is accentuated and ringing, the whole heart usually enlarged. Syphilis, rather than rheumatism, is then the history. Aortic aneurisms occur in patients over forty with a history of syphilis or strain, rigid arteries, and present symptoms of pressure such as pain, cough and dyspnea, unequal pulses in the two arms, the heart displaced rather than enlarged, with the pulsation and, possibly, the bruit. The x-ray confirms the diagnosis. This is often difficult; accidental murmurs may occur in the young, especially in women, not rheumatic but anemic, without hypertrophy or other evidences of circulatory derangement.

The prognosis depends upon the cause. Sclerosis does not stop with the single valve lesion; the hypertrophy following it is brief, the downward progress rapid; sudden death may occur. Inflammatory cases in the young may cause little difficulty unless the narrowing becomes extreme and compensation fails. As with leakage, failing compensation is more serious than in the corresponding mitral disease. Sudden death rarely occurs. The course resembles that of mitral disease but is more rapid.

## TRICUSPID LEAK

This is the most common disease of the right heart. Primarily occurring it is congenital; otherwise it follows mitral disease. The anatomic changes are analogous to those occurring at the mitral valve; leakage and stenosis usually coexist. Relative insufficiency attends extreme dilatation of the right ventricle. The great veins become also distended; the heart muscles in time become degenerated. Some authors claim that this tricuspid disease prolongs life, by relieving the right ventricle of a distention that would otherwise prove fatal sooner than it does with the valve leaking.

**Etiology:**—Endocarditis previous to birth occurs most frequently at this valve. Occurring after birth the causes are those of the precedent left heart diseases. Atonic dyspepsia is frequently found in connection with anemia and tricuspid regurgitation, the latter probably being the



causal factor. Gibson attributes to continued fever a pronounced causative influence. Severe exertion such as climbing mountains throws a strain upon the right ventricle which may induce dilatation and relative tricuspid incompetence, the latter serving as a safety valve. Any other violent exertion may have the same effect.

**Symptoms:**—A description of a case of tricuspid regurgitation by itself would be strictly scholastic, as such cases scarcely ever exist. Obviously the symptoms would be those of venous engorgement, the blood being backed into the venæ cavæ and their roots. Venous pulsation is present; the liver enlarges; cyanosis and dropsy occur in due time. Before this debility is manifested we have interference with digestion, diarrhea, hemorrhoids and enlargement of the spleen. The serous cavities are said to be apt to fill up with serum rather than general dropsy to occur. Cough and dyspnea would not be as marked in primary tricuspid disease as they are in the form following mitral disease. Babcock attributes the rapid failure in nutrition and development of dropsy, occurring when the tricuspid has become involved, to the obstruction presented to the escape of its contents from the thoracic duct, by venous tension.

Inspection shows dilatation and pulsation of the jugulars, these vessels collapsing during their diastole; other superficial veins are also dilated. Palpation of the liver may also detect venous pulsation there. The arterial pulse is small and weak, sometimes irregular and intermittent. Dropsy is a late symptom. The coëxistent disease usually renders percussion of little or no value. Otherwise it will show an increase of the cardiac dullness to the right. Auscultation shows a murmur with the first heart-sound, heard most distinctly over the ensiform cartilage, extending upward and to the right. The heart sound is muffled or replaced; the second sound may be accentuated.

**Diagnosis:**—The murmur alone must not be depended upon; but the symptoms caused by leaking at this valve are too significant to be misunderstood by anyone who comprehends the circulation. The prognosis depends upon the state of the primary disease. Relative incompetence due to over-exertion usually subsides quickly under proper care. Death occurs from the prolonged exhaustion.

## TRICUSPID STENOSIS

This is probably the rarest of valvular diseases. It may be congenital or acquired; the former may be caused by inflammation or may constitute a defect in development. In the latter case other defects of the circulatory apparatus often coëxist. Inflammation causes thickening, stiff-

ness or adhesion of the leaflets, and vegetations. Insufficiency usually coexists. The neighboring parts of the heart-muscles may be involved. The right ventricle becomes hypertrophied and in time dilated; but if the tricuspid obstruction is great and regurgitation slight, the ventricle contracts; the right auricle, however, becomes greatly dilated and somewhat hypertrophied.

**Etiology:**—Occurring posterior to birth, the cause is inflammation, generally rheumatic. Syphilis may also be the cause, or puerperal conditions. The disease is much more frequent in females, and between twenty and thirty years of age.

**Symptoms:**—Most cases have first been diagnosed on the post mortem table. The preëxisting mitral disease usually completely overshadows this. There is no dyspnea, because the blood furnished the lung is diminished in quantity. The pulmonary tract in fact is comparatively empty, as well as the arterial system, while behind the tricuspid valve we find engorgement from the blood backing up successively to the right auricle, the venæ cavæ, the hepatic veins and the roots of the portal system and of the venæ cavæ. Capillary stasis results with cyanosis and dropsy beginning at the feet and extending upward. Portal stasis gives rise to gastric and intestinal catarrh, hemorrhage and diarrhea, anorexia, indigestion and innutrition, enlargement of the spleen, hemorrhoids and ascites. The jugular veins are distended, but only show pulsation when the right auricle has hypertrophied, when we have a diastolic-presystolic pulsation, but not collapse of the veins following it unless regurgitation is also present.

Unless the venous pulse is present inspection gives no sign distinguishing this disease from the precedent mitral affection. The pulse is small and weak, sometimes irregular or very rapid. Babcock describes a case in which there was a short thumping impulse in the epigastrium, similar to but distinct from that of the associated mitral stenosis; also a short presystolic thrill between the ensiform cartilage and the left costal cartilage. Percussion shows the increased size of the right auricle at the right of the sternum. Auscultation may show a murmur, most distinct over the ensiform cartilage, presystolic; but in practice this can rarely be made out in the tumult occasioned by associated disease. The alteration in the shape and size of the heart may so change its relations that the murmur is heard at other than the classical points.

**Diagnosis:**—This is rarely made during life. The prognosis is not good, the disease occurring late in the history of mitral disease. Failing compensation is not usually restored. Albuminuria and effusion into the serous sacs, with cyanosis and extreme dyspnea, indicate the



approach of the end. But it is often a mystery to account for the prolongation of life in such cases. Death generally comes from extreme exhaustion.

### PULMONARY LEAK

This is a rare form of heart-disease and very rare as occurring singly. Babcock has observed one case. We may have relative incompetence from extreme dilatation, or imperfection of the valve from disease of the leaflets. The latter may be congenital or acquired. In relative insufficiency the artery and ring are stretched, the vessels atheromatous, the leaflets increased in length and breadth. The same inflammatory changes may be seen as in other valves. Sometimes the leaflets have been found torn into shreds from inflammatory softening. Even the congenital cases are rare. One should not be in a hurry to diagnose congenital valvular disease in infants from a murmur without other evidence. Cotton denies the possibility of accurate diagnosis between functional and organic murmurs in such cases. The writer has heard such murmurs, and found on examining the children in later years that the murmurs had completely disappeared, and no evidence of circulatory derangement remained. If structural disease really exists there is usually also a pervious septum or ductus arteriosus. In the acquired form the right ventricle becomes dilated or hypertrophied, the tricuspid valve becomes relatively imperfect and the symptoms of venous engorgement follow. Degeneration of the heart muscle ensues in due time.

**Etiology:**—In the usual secondary form, the cause is abnormal tension of the pulmonary artery, which may be due to disease of the heart or of the lungs. Mitral disease is therefore the usual cause, either primary or secondary to aortic disease. Inflammation of the valve is less frequently rheumatic than it is septic, and is especially apt to accompany pneumonia or puerperal infections.

**Symptoms:**—The symptoms of mitral or aortic disease precede and accompany and usually mask those of the pulmonary defect. The right ventricle probably becomes exhausted, and the tricuspid valve insufficient somewhat more quickly; but as there is no definite course for these maladies this can only be inferred. Possibly we may find a murmur with the second sound, heard most distinctly about the head of the third left rib. When the disease occurs primarily it usually remains latent, perhaps throughout life.

Inspection shows nothing characteristic unless it may be a heart-impulse stronger than normal, which is due to hypertrophy of the right ventricle. Palpation shows epigastric pulsation due to the same cause.

The pulse differs markedly from that of aortic regurgitation in that it does not show the sudden beat with rapid collapse of the latter. It is small and weak, the rate depending on the compensation. The enlarged right ventricle extends the cardiac dull area downward and to the right. Auscultation shows the presence of the murmur described above. However slight may be the alteration of the second sound in the pulmonary area it is significant.

The diagnosis is between pulmonic and aortic disease. The murmur from the former is not heard to the right of the sternum, where aortic sounds are almost invariably audible. The other characteristics of aortic disease are absent. The prognosis is grave, excepting primary cases, where if compensation is exactly balanced the lesion has been known to exist for fifty years. Albuminuria and dropsy are significant. Death occurs from exhaustion, the last stages being long drawn out.

## PULMONARY STENOSIS

This affection is rare as a congenital lesion, very rare as an acquired one. Babcock could find only eight cases of the latter reported since 1871. These showed traces of recent inflammation, the pulmonary artery usually being dilated. The valves showed vegetations or other deformities. In congenital cases the edges of the valves usually adhere and the artery is narrow. The ductus arteriosus is usually but not always open. Various forms of maldevelopment have been described.

**Etiology:**—Congenital cases are caused by fetal endocarditis, or imperfect development; cases occurring after birth are due to acute infections like rheumatism.

**Symptoms:**—In congenital cases the patients are weakly, mentally and physically undeveloped and cyanotic. They usually die of phthisis. Many cases show no symptoms by which the disease may be suspected in its earlier stages; later we have debility, shortness of breath, and the symptoms already so often described as resulting from the interference with the circulation. The right ventricle becomes hypertrophied, the tricuspid valve in time becomes insufficient and the classical symptoms follow.

Cyanosis is not only always present or uniform; it is most marked about the face, fingers, elbows and knees, and is worse on exertion or strain. It usually indicates an accompanying imperfection of the septum. In the acquired form the patient is pale, the superficial veins swollen, the right ventricle enlarged. This contributes a heave, evident on palpation, with a thrill in the pulmonic area, the second left intercostal space



near the sternum. The pulse is small, weak and rapid. Percussion shows enlargement of the right ventricle and later of the auricle. Auscultation detects a murmur most intense in the pulmonary area and extending to the left; it is not transmitted to the cervical arteries.

It accompanies the first heart sound; the second sound is weak or absent in the pulmonary area.

**Diagnosis:**—The limitation of the murmur to the pulmonary area distinguishes this from the aortic lesions, while the evidence of hypertrophy of the right ventricle and the history of infectious disease preceding, usually suffice. The radial pulse is markedly affected in aortic disease but not in this. Cyanosis and phthisis indicate the pulmonary lesions.

These patients rarely live to see thirty, falling victims to phthisis during early adult life. Sometimes death is directly due to the weakness of the heart.

#### DIAGNOSTIC MURMURS OF VALVULAR HEART LESIONS

A murmur with the first heart sound, most intense at the apex, means mitral leakage.

With the second sound, most intense at the apex, mitral stenosis.

With the first sound, most intense at second intercostal space, right of sternum, aortic stenosis.

With the second sound, most intense at second intercostal space, right of sternum, aortic leakage.

With the first sound, most intense at second intercostal space, left of sternum, pulmonary stenosis.

With the second sound, most intense at second intercostal space, left of sternum, pulmonary leakage.

With the first sound, most intense over ensiform cartilage, tricuspid leakage.

With the second sound, most intense over ensiform cartilage, tricuspid stenosis.

These form the alphabet of valvular heart-diseases; the exceptions and many useful additional data concerning each of these will be found in the detailed description, but this table forms the beginning which every clinician should firmly implant in his memory, adding whatever subsequent knowledge he may obtain from time to time. Multiple lesions will simply present two or more of the murmurs here described.

In interpreting the meaning of these abnormal valvular sounds or murmurs, it is necessary in all cases to take into account the concomitant circumstances, especially the circulatory conditions. There can be no decided imperfection of a valve without occasioning abnormality in the distribution of the blood. An apparent pulmonary murmur with evidences of aortic valve disease may signify an abnormal position of the heart. Similar lack of correspondences may be detected in other cases.

## COMBINED VALVULAR LESIONS

Sometimes these heart-diseases commence with one of the lesions of a single valve that have been described. The other valves become implicated by extension of the original disease or as a result of the mechanical conditions involved. At other times more than one valve may be implicated at the onset, or we may have both narrowing and leakage of the same valve.

The causes of mitral disease frequently occasion both constriction and insufficiency, especially in adults. There is less dilatation than when the leak exists alone. So also the ventricular atrophy of extreme obstruction, the auricular hypertrophy of the same and the auricular dilatation attending free leakage, are all lessened by the accompanying lesion. Hence, the two lesions to a certain extent relieve the symptoms caused by each. The development of symptoms depends upon compensation. The diagnosis is generally simple, being made by the combination of the signs of each lesion already described, the general symptoms being less marked. The prognosis is also better than for either lesion alone for the reasons just given.

The combination of mitral and aortic stenosis makes a serious impediment to the circulation. The left ventricle contracts, the left auricle and right ventricle are greatly hypertrophied. The symptoms are early and pronounced, the congestion of the lungs becoming extreme. Dyspnea is distressing, the venous trunks and roots become engorged and cyanosis occurs early. The pulse is very small and weak, the arterial system containing very little blood. The diagnosis is made by the combined murmurs described in previous chapters. Right ventricle hypertrophy develops rapidly and soon runs into dilatation. The prognosis is bad, the course of the disease being rapid and restoration uncertain.

Mitral stenosis with aortic lesions may also be a serious combination. The left ventricle becomes hypertrophied and dilated, the same processes occurring in the left auricle and right ventricle. The symptoms vary according to the degree in which each lesion is present. Dyspnea is always present upon exertion, especially when the mitral disease predominates. The diagnosis is made by the signs of the two lesions, somewhat modified by each other. The prognosis is practically that of mitral stenosis.

Mitral leakage with aortic obstruction is one of the most serious combinations possible. The latter lesion intensifies the former. The obstruction to circulation is very great; the whole heart enlarges and the right ventricle bears the weight of the whole circulation. The course is therefore a rapid one through the stages of hypertrophy, dilatation and



degeneration. The symptoms are those of mitral disease of extreme character. The pulse is small and weak, the apex beat displaced downward and outward, the cardiac dullness increased in all directions. The two characteristic murmurs may be heard at the apex and in the aortic area. The prognosis is grave, the course rapid, compensation failing early and treatment being of less avail than in most varieties.

Aortic and mitral leakage combined occur in the late stages of aortic disease. It is less serious than the variety just described, the mitral leakage moderating the effect of the aortic. Still the arteries have too little blood, the pulmonary and venous systems being engorged. The heart is enormously enlarged; the right ventricle sustains the circulation. The pulse is small and collapsing, while auscultation reveals the two characteristic murmurs. The prognosis is better than usual, as compensation may remain for a long period. When once broken there is little chance of restoration. When the mitral leak occurs from relative insufficiency it marks a serious stage of the malady.

Babcock believes that aortic stenosis and leakage are less frequent than is believed by those who depend upon the murmurs alone to establish a diagnosis. Without the accompanying indications described these murmurs may signify simply irregular vibrations of the valve leaflets. The symptoms depend upon which element predominates; leakage may be compensated for many years; stenosis less likely. The ventricle dilates and dyspnea with palpitation occurs after slight exertion, more than would be the case with either lesion alone. The pulse is smaller and its collapse less marked than in aortic leakage alone, larger and more rapid than in stenosis alone. The heart's impulse is weaker than in leakage alone and the dullness indicates less enlargement. A systolic thrill may be felt in the aortic area. The diagnosis is difficult, often impossible as the distinguishing signs of each lesion are modified to some extent by the presence of the other. If stenosis predominates we have a slow, small, collapsing pulse, strongly circumscribed, not greatly displaced apex impulse, systolic aortic thrill and bruit, without powerfully throbbing and thrilling cervical arteries, no double femoral souffle or capillary pulse but a regurgitating murmur. The prognosis is not good. When compensation once fails it is reestablished with great difficulty.

#### GENERAL PROGNOSIS

The course of a valvular heart disease will depend upon the lesion, its immediate and ulterior effects and the personal condition of the case.

Stenosis is usually more serious than leakage but the degree affects the result. The most serious of all the lesions is aortic leakage. In

the young compensation is more likely to prolong life indefinitely. In the aged the sclerosis is more general and compensation is brief and partial. Sudden death is especially liable to occur in this condition. Intercurrent rheumatism may also impair compensation which is very difficult to restore.

Aortic stenosis is less serious. The hypertrophy does not give way to dilatation unless the obstruction is very great. Compensation once broken is not likely to be repaired. Extreme stenosis is even more serious than extreme leakage and the combination of the two is still graver. The ingenuity of the physician may be taxed in their management.

Mitral stenosis is more ominous than mitral leakage; the former increasing from the continuance of the original disease and the deposit of fibrin. Mitral leakage admits of a better prognosis than any of the three other affections of the left heart. If not too free and uncomplicated, life may be prolonged with activity to the full expectancy. Sudden death is quite rare.

Tricuspid leakage is an incident in the history of mitral disease and enough has been said concerning it. The other affections of the right heart are too rare to require special discussion.

The prognosis, therefore, depends much more upon the seriousness of a lesion than upon its presence. The degree to which the circulation is sustained by compensation is an important factor. If the compensating conditions are sufficient and remain at a standstill the prognosis is good. Complications, intercurrent acute maladies, renewed attacks of rheumatism, embarrassing adhesions, constitutional disease of the kidneys, etc., phthisis, anemia, digestive disorders, old age or very young age, temperament in which we may include tractability and the possession of common sense, each influence the prognosis. Women are more subject to mitral disease, men to aortic leakage. The occupation is an important factor, strong exertion shortening compensation. The habits of overeating, indulgence in tobacco, alcohol, other habit drugs, and sexually, with bad hygienic habits generally, exert an evil influence; unsanitary hygienic conditions all work far more harm in these cases than in ordinary individuals. The knowledge that a patient has a defective heart is usually beneficial, as he may thereby be more easily induced to so regulate his life as best to delay the progress of the malady. Some persons, however, are frightened into hypochondria, insanity or even suicide by such information. A most important element in the prognosis is to be found in the comprehension by the patient's physician of the true value and applicability of heart tonics and other means of treatment, as well as their special applicability in each particular case.



The foregoing considerations should suffice to guide the physician in examination for life insurance. Babcock advises to reject cases of pronounced mitral stenosis and aortic leakage and considers mitral leakage and moderate aortic stenosis reasonable risks. The considerations just described, however, show the impossibility of determining such a matter on the presence of the valvular defect alone.

#### TREATMENT OF VALVULAR DISEASE

We will first consider those cases in which compensation has been established, and the circulation is maintained in a fairly normal condition, nothing having occurred to direct the patient's attention to his imperfection. Even severe bodily exertion does not occasion dyspnea or palpitation more than with persons whose hearts are unaffected. When compensation is incomplete severe exertion causes evident distress. When compensation has been lost physical exertion becomes impossible and even when at rest the engorgement of the veins, with dropsy and other symptoms, are manifest.

No secondary circulatory effects are evident with perfect compensation. The same restrictions are therefore not necessary as in the other two classes. Our duty consists in prescribing such a mode of life as will longest sustain the circulatory equilibrium thus happily established. It is unnecessary to acquaint the patient with the existence of the lesion unless his mode of life be such that he is likely to be injured by it, especially if he is unduly nervous or apprehensive. In the vast majority of cases, however, a knowledge of the existence of such a lesion is the most important element in holding the patient in due restraint. This is a case where the physician *must* dominate, or retire from the case.

**Physical Exertion:**—The occupation should be such as will sustain the patient in good health without throwing an undue strain upon the heart or his general muscular system. Mitral disease requires restraint in this particular unless very slight. Dyspnea should be the signal for physical rest. The amount of exercise required will in every case depend upon the physician's study of the case and the effects of the exercise.

The same rules apply to a case of mitral stenosis. Palpitation indicates that too much exercise has been taken.

In mitral leakage compensation is never absolute but only relative, because engorgement of the lungs is necessitated by the right ventricle hypertrophy on which compensation depends. Slight lesions may be disregarded. Rheumatic cases bear exercise better than the sclerotic form. Palpitation or dyspnea must still be avoided but exercise short of producing these symptoms is permissible. The muscular development

and the habits will influence each case. Mountain climbing is especially to be avoided.

Aortic leakage allows more exercise than any other form of heart disease, except in the sclerotic form; in fact, Stokes used to order severe exercise for such patients with a view of developing left ventricle hypertrophy when insufficient. Nevertheless, care must be taken that the exercise does not cause hypertrophy in excess of the need.

After the fortieth year arteriosclerosis and other degenerative processes become more frequent and closer limit should be placed upon the physical exertion permissible. However, these patients must not be allowed to sink into sedentary habits. Moderation in exercise does not mean its entire disuse.

The occupation permissible for such patients depends upon the principles just established as to exercise. Straining of every description and long-continued severe exertion are objectionable. The inhalation of dust is especially injurious to persons with congested lungs. Exposure to bad weather and sudden changes of temperature are bad for these persons, who catch cold easily and with whom catarrhs are obstinate. Indoor and mental work is recommended by Babcock for mitral patients and those with serious aortic lesions; outdoor work for compensated aortic leakage, slight aortic stenosis and some mitral leakages.

All excesses are injurious; sexual indulgence especially. Serious failure of compensation in either sex is apt to follow marriage. The use of tobacco is always injurious although if the habit has been formed, compensation perfect, and the patient can be trusted to use the drug with moderation, it may not do perceptible harm for some years. Tobacco smoke always increases the bronchial irritation and anemia. MacKenzie used to forbid tobacco to those with whom it induced salivation and frequent spitting.

An alcoholic debauch is always capable of destroying compensation. There is no need for alcohol in these cases and its effect can never be exerted upon the diseased heart beneficially, while in most cases its use is productive of injury, in any form or quantity.

Marriage is to be advised for persons with compensated heart-lesions only when the influence of unrestricted indulgence has been explained and the patient thoroughly comprehends what is to him normal and harmless indulgence. As to the wife, we have also to take into consideration the comforts to be secured in the home to which she goes, and the intelligence and consideration of the husband to whom she entrusts her life. Pregnancy and childbearing are often withstood by such women without serious harm. Nevertheless, the question is one of the gravest in every



such case. Women with mitral disease should not marry, as no woman has a right to marry whose physical condition is such as to render it inadvisable that she should endure the perils of pregnancy and childbearing. When such a woman, however, marries and becomes pregnant, she will require care on the part of the physician throughout her whole term of pregnancy. The venous engorgement must be kept in check by saline laxatives, passive exercise by massage alone permitted, but this must be enjoined, the diet should be most carefully regulated; and when labor occurs delivery by instruments under chloroform secured at the earliest possible moment. Aortic disease is less serious, nevertheless Davis found that more than 50 per cent of mitral and 23 per cent of aortic cases succumb to the dangers of pregnancy and gestation.

Babcock sums up the matter by stating that pregnancy is a grave condition not necessarily perilous to these cases. Labor is a real danger, in mitral disease especially so, the degree depending upon the compensation and other conditions present. Special care is required as labor approaches, with early instrumental deliverance. The dangers of the marriage should be clearly set forth to both parties and they should be advised frankly not to marry. If compensation is imperfect, pregnancy should be interfered with only when compensation cannot be maintained or when serious symptoms have already supervened.

The question of clothing is of importance. Changes in temperature, etc., have an effect upon the tension of the circulation which is of much more importance than with normal individuals. Care should, therefore, be taken by all such patients to avoid the effects of these changes, by wearing woollens next to the skin, keeping the hands and feet warm during cold weather, especially protecting the feet against dampness, and having the clothing too loose to constrict superficial vessels. A tight undervest is as bad as a tight corset. Women's skirts should be suspended from the shoulders and not from the waist.

Prolonged hot baths relax vascular tension and weaken the heart, especially with mitral cases. In all cases, however, bathing should be regulated by its effects on the patient. Swimming is in many cases a dangerous pastime. Turkish baths should not be permitted unless the physician is present and observes their effects. In general, "rag" baths with rubbing are preferable to tubbing.

**Diet:**—In no class of maladies is the question of diet more important. This may be best comprehended by a consideration of the mechanical conditions presented in the circulation. The heart is a force pump whose duty is to project the blood through the circulation. It is obvious that the greater the bulk of the blood the greater is the task thrown upon the

heart. Every lesion of the valves throws an additional burden upon the heart, inducing first hypertrophy and following it the entire list of lesions described. It seems obvious, therefore, that the first indication in the treatment of all valvular diseases of the heart is to reduce the work of this organ to the lowest point compatible with the maintenance of health. It is obvious that this can be done by reducing the bulk of the blood, provided we can retain in a smaller quantity of the fluid the full amount of nutritive material existing in it when expanded with water. This indication can be met by putting the patient upon a carefully balanced ration. The solid constituents of the food should be so arranged as to give the patient the exact quantity of proteids, carbohydrates, fats, salts and water, which he requires to sustain his activity at the desirable point, and not a grain more. Especially is it desirable to rid the patient of superfluous and encumbering fat, which may be done quite agreeably by restricting the quantity of water, and by massage or other appropriate forms of exercise. The same thing may be said in regard to the presence of anemia or of plethora. These conditions call for such a regulation of the foods as will restore normal conditions.

Every intercurrent disease must be promptly treated, with the utmost care, as the consequences are liable to be far more serious than they would be for normal individuals. In children especially rheumatism must be detected even if it only appears in the form of a sore-throat or a chorea, or even a cold in the head. Every pains must be taken to prevent respiratory catarrhs becoming chronic. Infections are to be avoided or if inevitable, treated promptly and effectually, most assuredly not on the expectant plan.

Drugs are to be used only to fulfill distinct specific indications. The man who only knows that digitalis is good for heart-disease, if he still exists, should be encouraged to find some other employment than the practice of medicine. In fact, during the period of compensation, while the greatest stress is to be laid upon the hygienic regime, there is little occasion for any drug excepting for intercurrent conditions. Among these constipation and flatulence are not to be neglected.

It is difficult to overestimate the evil effects of autotoxemia. On this subject Babcock says: "Two conditions likely to prove more injurious to individuals with a valve lesion although compensated than would be the case if his valves had not been damaged, are constipation and flatulent distention of the bowel. In both splanchnic irritation and consequent alteration of blood-pressure, but in the latter the effect of mechanical encroachment upon the contents of the thoracic cavity, must be reckoned with. Uncorrected it may contribute materially to the



destruction of heart-adequacy, to say nothing about the patient's comfort in the way of post-prandial breathlessness in mitral and tender to palpitation in aortic disease. Both disorders of the digestive function tend to impair the appetite, give rise to neuralgias, anemia, coldness of the extremities and many other phenomena of autoinfection. Moreover, flatulent indigestion, probably through the absorption of toxins, is a frequent cause of deranged cardiac rhythm. This not only annoys or even alarms the patient but it may even lead to the development of dilatation.

Hence the treatment of these intestinal conditions is most essential. An evening dose of podophyllotoxin with a morning dose of saline and a sufficiency of intestinal antiseptics meet the difficulty. The heart-tonics are not to be used unless the digestive affections occasion temporary disorder, in which case cactin is the best remedy to steady the heart, while glonoin relieves palpitation or vertigo; the two may be taken together. Digitalin should be saved for more serious conditions. Rest is more essential than drugs.

**Climate:**—Some patients do better in elevated regions than near the sea level; with others a heart-lesion hitherto unsuspected is apt to develop on ascending a few thousand feet. Babcock finds patients with mitral or aortic stenosis and mitral leakage with adhesions endure high altitudes badly. The amount of exercise taken, however, is of importance. Patients first going to high altitudes should strictly confine their exercise to such as can be taken without dyspnea or other inconvenience. Until they have ascertained what the general effect of the altitude is going to be, the less exercise the better.

The cases in which the writer has observed the development of heart-lesions in the mountains have been in elderly persons with sclerosis. This, however, may be an exceptional experience.

**Treatment When Compensation is Imperfect:**—The causes of the failure of compensation must be carefully considered and remedied as far as may be possible. The hygiene of the case requires the most minute regulation, the habits need the most exact surveillance. Every unfavorable influence that can be removed aids in delaying the progress of the malady and in prolonging the patient's life. It is often advisable to inaugurate treatment by a term of absolute rest in bed, with massage, until decided improvement has occurred. The diet, solid and fluid, should also be closely restricted until we are able to determine the quantity of each the patient can take with advantage and manage successfully. After this, additions to the exercise and the diet are to be made gradually and under close watch, that no excess be permitted to cause a setback. Any intercurrent affection must receive prompt and effective treatment.

The digestion may be sedulously cared for, constipation prevented, artificial digestants employed freely if needed, and business and other annoyances excluded.

The question of the use of the heart tonics is an exceedingly nice one, but perfectly comprehensible if the mechanical conditions involved are understood. Digitalis contains at least four active principles of varying powers. Digitoxin is the most powerful as a heart- tonic and still more as a contractor of the arterioles. The latter power causes it to increase the work of the heart by lessening the lumen of the outlets through which the blood must be forced; and also endangers the patient by so contracting the renal artery as to check or even completely suppress the excretion of urine. Besides, the action of digitoxin is so slow that Fraenkel, administering it hypodermically to a cat, found that the effects were not manifested until the expiration of 60 hours. Digitoxin is also insoluble in water. Digitalin is a doubtful principle, probably consisting of a mixture of several, in varying proportions. It is more soluble than digitoxin, but required 30 hours for its effects to be manifested, in Fraenkel's experiments. The preparation known as Germanic digitalin is really digigitalein. It is freely soluble in water, and its effects are evident within half an hour after administration. It has all the heart- tonic power of the drug, with a minimum of the contractile effect upon the vessels. It acts as a diuretic only by restoring vascular and cardiac tone when deficient, and hence is not in this respect or any other synergistic with digitonin, which depresses the power of the heart and acts as a diuretic only by relaxing excessive vascular tension, such as is produced by digitoxin. The idea that a union of digigitalein and digitonin would secure the maximum diuretic effect of digitalis is therefore an error. The effect of such a mixture would be that of the predominant ingredient, minus the other one. From these considerations it seems clear that the safest and most effective manner of utilizing digitalis is to administer only the pure digigitalein, or Germanic digitalin as it is commercially entitled.

While the effects of this glucoside are uniform as to quality and quantity of action, the conditions presented by the patient vary widely. The solubility and quick action of this principle enable us to administer small doses in rapid succession until we have secured exactly the effect we desire; after which smaller doses may be employed to sustain this effect. The writer gives digitalin Germanic, gr. 1-67 in hot water, preferably allowing it to be absorbed from the mucous membrane of the mouth, and repeats this dose every half hour to two hours, until the pulse has been restored to normal tension.



We look to the pulse rather than to the heart for the indication of digitalin effect. Relaxation of the circulation itself constitutes an obstacle which the heart is compelled to overcome; if arterial tension is exactly restored to normal, this obstacle is removed and the heart's work facilitated. The circulatory swamp is thus canalized. But if any excess is given the arteries are unduly contracted and this offers another obstacle for the heart to overcome. There is perhaps no instance in the field of medical practice where the nicest balancing of therapeutic action to the needs is so absolutely essential as here. Too little fails, too much injures. Not only so, but too large doses tend to restrict the elimination by the kidneys, and to wear out the reserve forces of the heart by overstimulation and by adding another burden. The value of this nice regulation of the dose may be seen in cases where the circulatory balance thus obtained has been sustained for years by the daily use of digitalein. The heart's powers are thus conserved and its nutrition enhanced, so that an actual material improvement in the conditions is secured, instead of a simple temporary check given to the disease.

Whatever dose of digitalin may be required to attain such balance is to be given. It may require gr. 1-4 three times a day, or even more, and if so such doses are to be given fearlessly. Usually, gr. 1-12 three times a day suffices, and after a few days this may be gradually reduced to about gr. 1-20, twice a day, which will be found an average for continuous use.

Digitalin is the remedy conspicuously for mitral lesions. If the physician clings to the galenic preparations he had better confine himself to digitalis and eschew all the other heart-tonics, because he is scarcely likely to obtain any of the others in as good quality. Digitalis is used more than all the other cardiac tonics many times over, and the physician's chances of obtaining a good and recent preparation are much better than when he prescribes adonis, convallaria, or other seldom employed articles.

The case is different to those who prefer the active principles. These glucosides when made into granules with pure sugar of milk will keep for an indefinite number of years without change, and the nice discrimination they allow may then be utilized.

In sclerotic cases, when the arteries are rigid and the constricting effect of digitalis would be dangerous, there is but little danger in the administration of Germanic digitalin. This little may be obviated by the conjoint use of veratrine. It is usual for glonoin to be advised here. The effects of the latter are manifest within half a minute of its administration in solution, by the mouth, and rarely do these effects last more than five minutes. Under no circumstances are the powers of any dig-

italis derivative recognizable until the expiration of a much longer time; even digitalein begins in half an hour or a little less, and continues for four to six hours. The conjoined administration of this and glonoin is far from securing simultaneous action. With veratrine it is different. Given in doses of gr. 1-134 x in solution, its effect begins about as soon as that of digitalein, and continues even longer. The effect of these small doses on the heart muscles is tonic, on the arteries relaxant; in both ways it enhances the action of digitalein, and the two further agree in stimulating cardiac inhibition. The further action of veratrine in favoring elimination may or may not be desirable—in the vast majority of cases it is most desirable. But if veratrine causes irritation of a catarrhal stomach, as denoted by a sense of warmth outlining the walls of this viscus, aconitine should be substituted in the same dosage. In aortic disease, where the constrictor effects of digitalis are more objectionable than in mitral cases, strophanthin is preferable. This exerts a powerful cardiac tonic action with the minimum of arteriole constriction. In sclerotic cases also, and when veratrine irritates the stomach, strophanthin may replace digitalin. The strophanthins in the market vary so widely in strength that the practitioner who desires to use this glucoside should select one reliable make and adhere to it. The tinctures vary as widely and in addition the strength of any sample varies from day to day. Of strophanthin, standard quality, gr. 1-500 may be given, in hot solution on the tongue, every half-hour till the effect is manifest. The daily dose thus established for that case may be then concentrated into three or four doses a day, as desirable.

The place of strychnine is not clearly comprehended. It is a universal incitor of function, but its stimulation of the inhibitory nerve and vasomotor contractors is less pronounced than its direct tonic action on the heart. It therefore comes in as an alternant with digitalin, or better, may be given simultaneously to enhance the effects of the latter. Dosage must be strictly for effect, and Babcock therefore speaks of giving gr. 1-30 every two hours, eight doses a day, continued for weeks with no harm but positive benefit. Curtin, however, holds that large doses are likely to cause short and irritable systoles instead of the long, strong ventricular contractions of digitalin. In any event, the maximal doses here mentioned are only applicable to cases of advanced disease with serious failure of the circulation. In many instances the weaker tonics are better suited to the task of inducing just the degree of stimulation that is needed and no more. This is where cactus is so useful. Sometimes a mere fraction of a drop of the tincture suffices. Its use in doses larger than five drops twice a day is not advisable.



Convallamarin is said to be especially valuable when it is desirable to stimulate the right ventricle rather than the left.

Apocynin is especially suitable when dropsy is a marked feature. This drug acts also upon the liver and in full doses is a cathartic. Its use is therefore indicated when the vascular tensor power of digitalin is insufficient. Apocynin is here next to digitoxin in effect but is a safer remedy and its action is more speedily exerted. The average adult dose is from gr. 1-12 to 1-6, repeated every four hours and carefully increased until the full effect is manifested by nausea or catharsis.

Petty, who has had unusual opportunities for observing the action of drugs, and has utilized these opportunities with unusual care, states that in some instances when digitalis has been given until worn out, he has rescued the patient from impending death by the hypodermic use of sparteine in doses of 2 gr. each. Smaller doses did not give the effects. In many instances when moderate doses of digitalin seem to lose their effect better results will be obtained by adding the other heart-tonics in succession, rather than by increasing the dose of any one of them. If, as seems probable, each of these drugs exert its maximum influence upon a different portion of the cardiac mechanism it is easy to be seen why this should be. In this manner, to the cardiac tonics above named we may add adonidin, barium chloride, erythrophloeine and other members of this group.

For vertigo, syncope, to momentarily combat cerebral anemia or relax an embarrassing tension, glonoin is the remedy. This drug exerts a quicker action when given by the mouth than hypodermically. Give gr. 1-250 in solution or let the patient chew the granule, and repeat every five minutes until the face flushes. When thus employed glonoin deserves the title given it by enthusiastic admirers of the "life saver."

Most writers on the treatment of heart-diseases recognize the great value of cathartics, but few explain the benefit correctly. The heart is always relieved by a reduction in the bulk of the blood, and if no better means were available to secure this benefit, a venesection might in some cases save life for the time being. But in addition the cathartic clears out toxic matter from the alimentary canal and encourages exosmosis from the blood to the bowel instead of the reverse which is so apt to occur. It is an object, therefore, not only to empty the bowels but to flush them, and for this purpose there is nothing better than a dose of calomel or podophyllotoxin at bedtime, followed by a saline immediately on rising. If conditions are such as to forbid the bulky saline solution we may inject into the colon or rectum a few ounces of glycerin or of a saturated solution of table salt.

It is of importance to watch carefully the condition of the patient's blood and meet any drain upon it by the administration of such tonics as may be needed, either iron, quinine, arsenic, the hypophosphites or manganese. Whichever of these is used a better effect will be obtained from the simultaneous administration of nuclein. This remedy seems to enable the body to retain iron and other nutritive products which would otherwise pass through.

Sometimes it is difficult to rid the patient of the pernicious idea that he must take exercise to restore his strength. The moral effects of a little massage may here be utilized with great advantage. In general it may be said that whenever compensation begins to fail the necessary work performed by the heart should be reduced to the lowest possible point until compensation is reestablished, after which no more work can be allowed than such as will not disturb this desirable condition. The regulation of such exercises requires as great precision and watchfulness as the regulation of the diet. Massage, resistance exercises and other movements performed under the eye of a competent director, should precede walking and other forms entrusted to the patient.

Of late years the Nauheim baths have attracted considerable attention as a means of treating heart-diseases. The waters at this resort contain the chlorides of sodium and lime and are highly charged with carbonic acid. At first baths are administered at a temperature of 95° F., the water containing 1 per cent of sodium chloride and 1-10 per cent of calcium chloride; the first bath lasts five to eight minutes; the baths are repeated daily with occasional omissions; the temperature being gradually lowered and the strength of the mineral constituents increased, the exact formula being regulated by the strength and reaction of the patient. At the maximum the percentage of chloride of sodium is 3, the calcium salt 1, the temperature 85° F. and the duration twenty minutes. Usually this is reached in three to four weeks. When the baths prove beneficial they render the pulse slower and stronger as well as more regular. The size of the heart diminishes while its sounds are stronger. Benefit is judged largely by the reduced size of the heart and its return to normal action. There is also a sense of improvement in the subjective symptoms. The benefit often experienced is remarkable, in fact some stress has been placed upon the pathologists to explain this benefit, but as the method originates in Germany, not America, and does not consist in the administration of drugs, an explanation of the benefit is sought, rather than a denial made of its existence.

The Nauheim system has been employed in America, especially by Dr. Babcock, and the results fully equal those obtained in Germany when



the same favorable conditions have been secured. It is obvious that the best results are obtained when the patient leaves his business and all environing irritations and devotes himself seriously to the business of his treatment. The method is unsuited to cases in which compensation is altogether lost, and to those presenting extensive arteriosclerosis, dropsy or adhesions, with degenerated heart-muscle. If the pulse does not show improvement after the bath, it is not doing good.

We have already discussed the subject of diet, as to the bulk of the food and especially as to the quantity of water which is permissible. The rations should be carefully balanced so as to contain the exact proportion of each food element required; the articles should be such as are digested easily with little residue. Flatulent articles like beans are to be forbidden. The tendency in these cases is to the excessive use of proteids with consequent toxemia. Flatulence from carbohydrates may be prevented by the use of some form of diastase. Flatulence of any sort is relieved by the administration of physostigmine. When degeneration of the heart-muscle is threatened, the proportion of meats should be increased, especially in the shape of eggs, fish and oysters, with milk. In all cases eating should be confined to the regular meal-hours and food between meals forbidden. The fresh fruit-juices must never be omitted. Such patients are often tormented by thirst, which may be relieved by chewing gum, or by giving a teaspoonful of hot water at intervals of 15 to 30 minutes. Patients who are constantly tormenting the nurse for drinks will wait contentedly, watching the clock, if they know they are to get something in a reasonably short time.

The exclusive milk diet is sometimes advisable, especially when disease of the kidneys is present. In general, the hygienic precautions described in the preceding chapter are applicable here. Especially we must emphasize the importance of avoiding alcohol and tobacco, emotional excitement, muscular strain, sexual and other excesses.

#### TREATMENT OF BROKEN COMPENSATION

In some cases, despite all our efforts, and in many others for lack of intelligent management, the patient arrives at a stage where compensation is not simply weakened but is broken or lost. It is here especially that we become acquainted with the immense power for good residing in digitalin, when intelligently employed. The careful physician has held this powerful weapon in reserve and therefore now obtains its full benefit. Here is an illustrative case: The writer was called to attend a woman, aged over 40, supposed to be dying of pulmonary consumption: She had

just had a severe bronchial hemorrhage, not the first one, and her history showed that she had been spitting blood for years. The legs were greatly swollen, the abdominal cavity contained some effusion, the urine was scanty and albuminous. Chronic bronchial catarrh existed with dyspnea and the lips showed the mulberry stain. The superficial veins were engorged. The primary disease appeared to have been mitral leakage, but she now showed a double mitral murmur with some implication of the aortic valve. This woman was placed upon digitalis and the hygienic regime herein advised. Improvement was not long delayed; she got up from bed in a few weeks and regained such activity as enabled her to attend to her household duties, attend church, go to market, and participate in the social pleasures of her class. This patient remained under my charge, enjoying the degree of health just described, for ten years, at the end of which time she died of cancer of the liver. This case is typical of a number, enough, in fact, to convince the writer that even after compensation has presented such serious impairment as has been described, a confirmed valvular lesion may be so managed as to enable the patient to live to the full period of his or her expectancy in the enjoyment of reasonable comfort and usefulness. \*

Little is to be added to the remarks already made upon treatment. Begin with absolute rest in bed, so arrange the diet as to reduce the bulk of the blood, relieve the heart of its overwork and thus stop its rapid exhaustion, meanwhile maintaining the nutrition at the highest possible point and aid the heart with a sufficiency of digitalin. In the case described, the bronchial hemorrhage was undoubtedly beneficial, but not more so than would have been the abstraction of an equal bulk of blood-serum by any other means. Here we must again call attention to the great value of the small enema of cold saturated salt solution.

When the serous cavities become distended with effusion it may be necessary to remove a small quantity, not exceeding a pint, to relieve the heart from embarrassment; the effusion will, however, be quickly reproduced; it is generally better to give apocynin with the salt enemas and seek to prevent the reproduction of the dropsy by close limitation of the fluids ingested. Diuretics act better after the bowels have been emptied by calomel and salines. Multiple punctures with a needle remove a vast amount of water from the tensely swollen limbs, but are not very popular with the patient. Southey's tubes do better; the writer has repeatedly employed these to drain the abdominal cavity with excellent effect, although in a few days the internal opening is occluded by an accumulation of lymph. Elastic stockings and bandages aid in restraining the tendency to effusion. Generally, diuretics act better after the removal of an effu-



sion by tapping. Cathartics are not as depressing as is usually taught. During the treatment of extensive dropsy I prefer to rely upon apocynin and to omit digitalin until after the dropsy has been reduced, when this priceless medicament will show more decidedly beneficial effects.

To relieve the so-called cardiac asthma no remedy in the writer's hands has given really decided benefit excepting strychnine arsenate. With proper hygienic regime and accessory treatment very small doses of this salt suffice, such as gr. 1-134 three times a day. But cases have been reported in which the daily dose reached 1-3 or 1-2 a grain with satisfactory results. Temporary relief occasionally follows small doses of morphine, but as a rule it is best omitted. Digitalin is a better hypnotic, producing that circulatory equilibrium which conduces to sleep.

### ACUTE MYOCARDITIS

This affection occurs in connection with acute infectious fevers. The disease may be parenchymatous or interstitial. The tissues are pale and opaque, soft, relaxed and easily torn; the fibers are swollen, the protoplasm granular, the striæ obscure; the fibers are frequently ruptured or torn apart.

The interstitial form may be purulent; the abscesses may break into the heart, the pericardium, or both; if into the blood-stream, pyemia and septic embolism follow.

**Etiology:**—The acute form occurs with diphtheria, typhoid fever, the eruptive fevers, gonorrhea and rheumatism. The intensity of the poison is more likely to cause myocarditis than its long continuance. Ulcerative endocarditis may extend to the heart-muscle, or septic emboli may enter the coronary artery. Microorganisms also enter by undetected channels. Sometimes the disease follows injuries.

**Symptoms:**—In diphtheria myocarditis develops late. It is indicated as to its presence and extent by weakness of the heart. The same is true of the malady when occurring during other infectious diseases. The liver may be engorged and the seat of pain. Venous engorgement and dropsy, with scanty albuminous urine, are present in extreme cases. There is then a sense of oppression, and pain under the sternum.

Death may ensue within two days, or not for two weeks; the malady is sometimes latent. Intervals of well-being may alternate with alarming crises. Very dangerous are the cases which develop during convalescence from diphtheria.

Rheumatic cases occur in hearts already diseased, the extension being inferred from the debility. In other infective fevers sudden weakening of the heart may be due to toxemia or to myocarditis.

The formation of pus is denoted by rigors, pyemic fever, sweating and swelling of the spleen. Rupture of the heart is quickly followed by collapse and death.

**Physical Signs:**—Pallor is marked, with apathy or anxiety; the pulse weak, empty and unstable; the heart impulse feeble or absent; there may be an increase in the area of cardiac dullness; the heart sounds are feeble and muffled, with the murmurs of accompanying disease.

The diagnosis is inferential; when during an acute infectious disease the heart suddenly fails, with the physical signs above noted and evidences of sepsis following, myocarditis may be assumed.

**Prognosis:** This is always grave, especially in the purulent form. In diphtheria the mortality is about thirty-three per cent. In rheumatic cases the prognosis is better. In any form death may occur suddenly. Weakness, rapidity and irregularity of the heart are proportionally grave. Delirium is a bad omen; embolism still worse.

Absolute rest is to be enjoined. The food should be highly nutritious, and easily digested or predigested. The bowels must be kept clear. The heart must be sustained by tonics but vascular tensors avoided. Strophanthin, sparteine and cactin are preferable to digitalin. On no account should digitoxin be given; small doses of morphine may be employed to quiet pain and restlessness. It is frequently dangerous for the patient to lift his head from the pillow; while rising from the bed to urinate is fraught with the utmost peril. Confinement to bed must be prolonged for some time after the attack has subsided, and even then for a considerable period the patient must not be permitted to put any strain upon the heart, such as is caused by ascending stairs.

## CHRONIC MYOCARDITIS

Fibroid degeneration occurs in the late stages of acute maladies. It may attend extreme fatty degeneration and be progressive. Section shows gray streaks and spots, slightly projecting. Atrophy of the muscle fibers precedes the fibrous hyperplasia. The wall may be thickened, or giving way it may permit the formation of a cardiac aneurism. Fatty degeneration causes pallor of the surface. The markings have been compared to a faded leaf; the tissue is soft and fragile. The protoplasm breaks down and fat drops appear. In the advanced stages, the fatty fibers are replaced by fibrous tissue.

In old age we have a mixture of fatty and fibrinous degeneration, with fatty overgrowth in the obese. Sometimes there is hypertrophy, with nephritis and atheroma; or atrophy with malnutrition, or pigmentation.



Innutation results from disease of the coronary arteries by which the supply of nutritive blood to the heart tissues is lessened.

**Etiology:**—Arterial disease, nephritis, hard labor, long marches, mountain climbing, excessive beer-drinking, toxemias, poor heart-nutrition, phosphorus, arsenic, cardiac hypertrophy, abuse of coffee, tobacco or alcohol, are the causes. It most frequently affects men.

**Symptoms:**—The malady affects strong, middle-aged men, brain workers of sedentary habits and large eaters and drinkers. The pulse may be normal, the signs negative except that the second aortic sound is accentuated, the superficial arteries stiff, the urine low in gravity. There may be a little palpitation, oppression or pain at the heart. The symptoms subside with rest and care but recur, each time worse, the urine becomes albuminous and scanty; the liver enlarges, dyspnea increases and portal obstruction becomes evident. The pulse weakens, the heart dilates, with insomnia, headache, hemoptysis and irritative cough. The course may be slow, but sometimes it is not recognized until near the end. Cardiac asthma, bradycardia and Stokes-Adams respiration may occur. Arrhythmia, tachycardia and asthma characterize varieties; the latter due to pulmonary edema, with throbbing arteries. Vertigo, syncope and other evidences of feeble heart attend. The mind may be sluggish or deranged. Angina pectoris may occur. Death may be sudden or follow gradual wearing out.

Inspection may disclose evidences of senility; palpation edema and an enlarged liver, stiff and tortuous arteries; percussion alterations in the size and shape of the heart; auscultation hypertrophy, weakness and valve murmurs, etc.

The diagnosis considers the causal maladies and is considered under their heads. The same may be said of the prognosis. Pulse tension is important; rapid development of heart weakness is bad; intermittence, palpitation, gallop-rhythm and angina are unfavorable. Edema is perilous. Death may be due to intercurrents.

**Treatment:**—The conservation of cardiac energy has been so fully treated under the head of valvular disease that repetition is useless. To the methods there described we have simply to add the hygienic routine indicated by the case, and the treatment of the special maladies underlying the heart weakness, and accompanying the cardiac disease. Vascular tension may require veratrine, gelseminine or aconitine, sclerosis may be delayed and possibly pushed back by the persistent use of arsenic iodide, the absorbable part of deposits may be taken up under the stimulus of mercury iodides, etc., angina pectoris is combated by arsenic iodide and glonoin, and the debility of the heart relieved by the mildest tonics

the case will admit, saving the stronger till the period when nothing else will avail. Climate and the resources of regime are to be utilized to the full extent. But the problem of prolonging the life is one to be studied anew with every case, and there is no simple and easy way to manage that can be laid down for all, or even for a large number of patients.

## HYPERTROPHY OF THE HEART

The muscular fibers of the heart increase in size and possibly in number, causing an increased thickness of the walls of the portion involved. The interstitial tissue is necessarily increased also, but much more slowly than the muscular fiber. On section, the affected muscle is firmer than usual, and is deep red. If the supply of blood is insufficient, the hypertrophy is partial and interrupted by areas of fatty or fibroid degeneration. The heart is increased in weight, from the normal eight and a half ounces for a female, ten ounces to a male, but more than double these weights is not uncommon. The largest heart weighed by the writer was twenty-six ounces, but much larger ones than this have been recorded. Concentric hypertrophy is quite rare, the cavity almost always being larger than normal.

**Etiology:**—Hypertrophy of the heart is usually secondary to valvular disease, adherent pericardium, chronic myocarditis or arterial sclerosis. It also occurs as a consequence of interstitial nephritis, where the vascular tension is raised; in fact, continuous abnormal vascular tension from a cause will give rise to hypertrophy. It is sometimes due to congenital narrowness of the aorta or of the entire aortic system. In such cases, as in valvular disease, the hypertrophy is due to an effort of nature to overcome the obstacle in the circulation. The hypertrophy usual in the excessive beer-drinkers of Germany is attributed to the increased nutritive supply, probably with the stimulation of the heart by the alcohol. Soldiers, mountaineers, those who carry heavy burdens, and the Japanese jinricky men, develop hypertrophy of the heart by excessive muscular exertion. It occurs also as a feature of exophthalmic goiter, and as sequel to emphysema and cirrhosis of the lung, pleural adhesions, and consequent deformity of the chest.

**Symptoms:**—The symptoms are due to the effort of the heart to overcome an obstacle and sustain the circulation. Inspection may show the apex beat displaced downward, outward in hypertrophy of the left ventricle, inward if the right ventricle is affected. Palpation shows a full, powerful, slow pulse, with high tension, due to the forcible impulse; also the heaving impulse by which the entire chest may be shaken. Percus-



sion shows an increase of the area of cardiac dullness, over the portion or portions of the heart affected by the hypertrophy. As the heart grows heavier, it also sinks downward when the patient is in the erect posture. Auscultation detects a loud booming first sound, somewhat prolonged, high tension with the second sound at the base, or of the pulmonic second sound when the right ventricle is affected.

**Diagnosis:**—The principal points are a full, tense pulse, slow or normal in rate; a powerful broad apex beat, displaced outward and perhaps downward; increased dullness to the left and upward, or universally; a booming, low-pitched first sound and accentuated aortic second sound. When the right ventricle is hypertrophied we have epigastric pulsation, dullness extending to the right and downward, and intense pulmonic second tone. The causal disease contributes its evidence. Displacement of the heart must be excluded. This may be due to curvature of the spine. Neurotic youths with thin chest-walls and broad intercostal spaces may show a rapid, forcible heart-action, resembling a hypertrophied organ, but without enlargement.

**Prognosis:**—This depends upon the original cause of the difficulty. If this be progressive the morbid process will continue until the limit of possible hypertrophy has been reached, when dilatation and degeneration will follow. Occurring in the young, from over-exertion, the prognosis is more hopeful.

**Treatment:**—The treatment is to be directed to the cause of the malady. Since hypertrophy is a conservative process it is not to be interfered with unless, as often occurs, it should exceed the requirements of the situation. We therefore look to the treatment of the original disease and to regulation of the individual's hygiene, forbidding excessive exercise of every description as well as excitement, and the use of coffee, alcohol in every form absolutely, and hot drinks and soups excepting in moderation. When it is necessary to curb excessive hypertrophy we rely upon veratrine, in full doses, which also relaxes vascular tension and by stimulating all the eliminant organs carries out of the body the toxins that would otherwise irritate the heart and stimulate it to unnecessary exertion. Moderation in the use of strong foods is also to be enjoined. Symptoms of threatened pulmonary or cerebral apoplexy may demand venesection; or if less urgent, the quickest acting hydragogue cathartics, such as croton oil or elaterium. Patients with hypertrophy are liable to be affected by pulmonary apoplexy on making a quick trip from the sea-level to elevations of five thousand feet or more. When the true hypertrophy is merging into false, and direct vascular depressants are not well borne, solanine will admirably replace veratrine.

## DILATATION OF THE HEART

Primary dilatation occasionally occurs when, after a prolonged period of sedentary life, a man puts upon this organ the unwonted strain of prolonged exertion, such as marching, climbing mountains, or engaging in athletic pursuits. With this exception dilatation is secondary to pericarditis, myocarditis or valvular disease. It is, in fact, but one step in the process and may for a brief period precede the development of hypertrophy, to which it succeeds in due course of time. The cavities affected are enlarged, the walls becoming stretched; the muscles flabby, the walls in time degenerated; the muscular tissue is pale, cloudy, sometimes stained with brown pigment. Dilatation may affect one chamber of the heart or all of them. Up to a certain point the valves opening into the dilated chamber will be elongated, but if the dilatation becomes extreme, the leaflets will not meet and relative insufficiency is established.

**Etiology:**—Dilatation is due to pressure exerted by the blood distending the affected chamber, with which its walls are unable to cope. The walls may be weakened by the general and local influence of acute infection. Relaxation is said to be occasioned by excessive emotion as well as excessive exercise; but in the vast majority of cases, where there has been an undue strain placed upon the wall of a cavity, hypertrophy has reached the physiologic limit and the strain still continuing, the wall dilates before the continuous pressure. In high altitudes a previously healthy heart may give way to the strain of unaccustomed exertion. Excesses in tobacco, alcohol, sexual and social indulgences, also reduce the resisting power of the heart-wall. The danger from over-exertion is avoided by a careful, systematic and thorough training of the heart and the other muscles so as to render them capable of enduring severe exertion before they are called upon. It is the untrained or over-trained athlete, or the strong man whose muscles have fallen away during prolonged periods of idleness, and who forgets this fact, who suffer from over-exertion. Their mishap is a powerful argument in favor of athletic training, when intelligently carried out and suited to each individual, who will thus be rendered physically capable of meeting emergencies presenting themselves without doing himself an injury.

**Symptoms:**—These may develop gradually or quite suddenly. The walls of the heart are weakened by over-distention and become incapable of keeping up the circulation; the heart becomes soft, feeble, rapid and irregular; the area of cardiac dullness enlarges; the impulse and the sounds weaken; dyspnea on exertion, with a sense of debility, are the first symptoms noted by the patient, who loses color also, and may display the bluish



tint of cyanosis. The urine becomes scanty, the liver swells and becomes painful; the abdominal vessels become congested, appetite and digestion weaken, flatulence and constipation are present, hemorrhoids develop, the sexual power subsides, and women complain of menstrual derangements and leucorrhœa. The ankles become puffy at night, this edema gradually becoming more pronounced. A cough becomes common, with hemoptysis. Conversation wearies the patient and hypostatic congestion occurs in the dependent portion of the lungs. The apex beat is almost imperceptible; the heart sounds almost inaudible, and relative mitral or tricuspid insufficiency contributes a murmur and increases the difficulty of the circulation. The symptoms steadily worsen, the dropsy ascends the limbs and appears in the serous cavities; the sensorium is dulled, and the patient dies of gradual exhaustion or of pulmonary edema. The heart may stop suddenly on quick exertion or some emotional disturbance.

The course may be prolonged for years. If degeneration does not exist, acute dilatation from over-strain will subside if due precaution be observed; but if repeated, the lesion will become permanent. It is, of course, much more serious in persons who have passed the climax of life and entered upon the period of decline.

**Diagnosis:**—The cardiac impulse is weak or absent; the area of cardiac dullness is enlarged, generally or partially; the heart-sounds are feeble, and may be obscured by valvular murmurs. The first sound is short like the second; the interval is also shortened; at the base, the aortic second sound is weak, the pulmonic accentuated. The diagnosis is not difficult, the symptoms being characteristic in acute cases. Supervening gradually, we have the rapid, feeble, irregular pulse, weak, slapping or imperceptible impulse, increased dullness, and feeble sounds with accompanying murmurs. Care must be taken not to confuse slowly developing dilatation with pericardial effusion. Hypertrophy is distinguished by the strong pulse and heaving impulse.

**Prognosis:** The gravity of the case depends largely on the presence of degeneration. Acute attacks from over-exertion soon subside under judicious management. Interstitial nephritis renders the prognosis gloomy. The greater the dilatation the more serious the case. The most serious form is dilatation of the left ventricle; but it is also more amenable to treatment. Irregularity of the pulse indicating degeneration is a bad omen. Dyspnea which is more serious than the apparent condition of the heart warrants is also a bad indication. Great restlessness and nervousness should also arouse the suspicion of the physician. Babcock says that this condition followed by a day of remarkable freedom is apt to be followed speedily by death.

**Treatment:** Acute dilatation demands that the heart be placed at rest by confining the patient to bed until the circulation is restored. The bowels should be swept out by a prompt cathartic—a mercurial followed by a saline. Digitalin should not be given until after the cathartic has operated; it should then be administered in small doses frequently repeated to desirable effect. The diet should be light, easily digested and unstimulating. Subsequently the amount and kind of exercise should be carefully regulated, and the patient kept under the physician's direction for a long time.

When dilatation is replacing hypertrophy, or when repeated strains threaten to render the condition permanent, the treatment is that which has already been described in the chapter on valve lesions. If the patient is desirous of prolonging his life to the utmost possible limit, with all the pleasure and usefulness which can yet be secured to him, he must pass his life under the care of a physician, who will so regulate it as to secure this result.

Sometimes the symptoms of over-distention become so distressing that immediate relief is required. The heart-beat is a simple fluttering, feeble and irregular, the face congested, veins swollen, dyspnea extreme, the lungs rattling with serum, sputa bloody and frothy, the extremities cold and blue; the heart is enormously dilated. The condition may be so grave that there is no time for anything excepting a free venesection; the amount of blood taken to be regulated by the results. Subsequently we strengthen the heart with digitalin, strychnine and cocaine, while we reduce the bulk of the blood by saline cathartics and enemas, and the rigid enforcement of the dry diet. In these extreme cases, Babcock does not approve of the Nauheim baths; he also finds it difficult to credit the enthusiastic reports of benefit from the resistance exercises, although both these measures have a place in suitable cases.

## RELATIVE MITRAL INSUFFICIENCY

This is a result of extreme dilatation of the left ventricle. It may be acute and transient or chronic and permanent. Predisposing are the diseases of the myocardium and aortic valves. Exciting causes embrace all influences causing abnormal strain in the left ventricle. Enormous physical exertion may give rise to dilatation enough to open the valve. Anemic girls occasionally present symptoms of this lesion; a systolic mitral murmur, enlarged heart, shortness of breath on exertion, etc. The symptoms have been described in the chapter on mitral leakage. In the anemic form we may have a little edema of the ankles, but



the engorgement of the viscera is slight. Dyspnea is the principal symptom, with debility, loss of appetite, indigestion, constipation, and innumerable evidences of autotoxemia.

The diagnostic question lies in distinguishing these anemic cases. They have no history of rheumatism or other infectious disease; the anemia is evident. The murmurs are not transmitted to the back, and a systolic murmur is usually to be heard most distinctly in the pulmonic area. The secondary heart-changes are absent.

The prognosis is bad in organic disease; following heart-strain or anemia the malady is curable.

The treatment of organic cases is that which has already been so fully described. The acute form occurring from strain subsides when the patient is kept at rest, with suitable diet and hygiene, as described under the head of dilatation. The anemic form subsides under the treatment of the blood condition. These patients can rarely bear cold bathing, but great benefit follows vigorous rubbing of the body with coarse towels dipped into hot salt water. As the strength increases, these same towels may be thus used after they have been dipped in the brine and then dried. In well-marked cases this method with the Nauheim baths should precede sea-bathing. It is of the utmost importance that the digestion should be regulated and autotoxemia avoided. Neuro-Lecithin greatly enhances the other treatment employed to relieve the anemia.

## FATTY HEART

This term is employed to designate the deposit of fat about the heart of the corpulent individual, to such an extent as to interfere with the functions of this organ. The fat lies beneath the epicardium and between the muscular fibers, which, however, are not necessarily degenerated, although they become atrophied with pressure.

The heart may be loaded with an enormous amount of fat and yet perform its function satisfactorily. Romberg attributes the difficulty to the simple proposition that a heart large enough and strong enough for the needs of a man weighing 140 pounds becomes relatively insufficient when his weight has doubled. Anemia may be present in such persons and a general lack of muscular tone. Symptoms of heart weakness appear after unusual exertion or weakening disease like influenza.

The causes are those of obesity. It is in some degree hereditary but tends to occur after mid-life, as the active habits of youth are gradually laid aside for the quieter occupations of advancing years. Many

women fatten after the change of life. The use of large quantities of food and the excessive use of liquors favor the development of fat. Beer also acts probably by the relaxation of tone. Alcohol in any form, however, is said to specially favor fatty overgrowth of the heart. However, the disease does not consist in corpulence, or in fatty overgrowth, but in the evident insufficiency of such a heart to carry on its function satisfactorily. All luxurious habits that relax muscular tone aid in the development of this insufficiency. It may also show itself for the first time when such individuals attempt the reduction of weight not wisely but too vigorously, by too rigid abstemiousness, and such vigorous exercise as results in overstrain.

Short breath is the first symptom, first noticed on ascending stairs, but produced by continuously slighter exertions, such as stooping. Vertigo comes next, when the patient rises to his feet after lying down, especially if he then urinates. The pulse becomes rapid as the heart weakens. It is small also and weak unless cirrhotic nephritis or atheroma cause tension. The rhythm is also irregular. The appetite fails, discomfort and dyspnea coming on as soon as the patient has eaten a little. Thirst is great. He is flatulent, constipated, the urine scanty and red; he is sleepy after meals but wakeful at night; dull headache is common. Judicious measures taken to get rid of the superfluous fat improve the patient's condition greatly but the utmost care must be taken in making this attempt, if the heart muscle is degenerated. Evidences of failing circulation must be watched for. Pulmonary edema, asthmatic attacks and anginous paroxysms may occur. The liver swells and becomes tender. Albuminuria appears and edema becomes manifest in the ankles. The patient is confined to his chair as the dyspnea becomes extreme. Sleep is broken and unrefreshing, and the patient dies of exhaustion, unless sooner relieved by intercurrent affections.

It is somewhat difficult to examine such patients on account of the obesity. The pulse affords reliable data as to the adequacy of the heart. A fairly strong, full, regular pulse indicates a correspondingly healthy condition of the heart. Any enlargement of the liver found may be fatty. It is impossible to tell by percussion whether increased dullness is due to enlargement of the heart or to mediastinal fat. The heart is apt to be crowded upward by the fat interfering with the descent of the diaphragm. Auscultation also enables us to form a fair estimate of the strength of the heart. The diagnosis of cardiac insufficiency is not difficult, being a matter rather of judgment than the detection of pathognomonic signs. The prognosis depends upon the conditions, the age, the causes, the history as of strain, the habits and tractability of the patient,



## CARDIAC ASTHMA

at especially upon the presence or absence of degeneration of the heart muscle. Heart failure, angina, asthma and sclerosis are bad.

**Treatment:**—The reader is referred to the chapter upon obesity. The patient must be warned against over-anxiety to reduce the weight quickly. The object is not so much a reduction of weight as it is of the establishment of a correct balance between the power of the heart and the work which it has to do. Hence we meet the difficulty by increasing the power or by lessening the work, or by both. Young patients will bear much more radical measures than older ones. The regulation of the diet and of the exercise forms a different problem for every case; the digestion must in all cases be kept up and nutrition sedulously maintained. The combination of corpulence with anemia, or enormous eating and under-nutrition, is by no means uncommon. In older persons who have long been accustomed to a full diet radical reductions are perilous. If active exercise is inadmissible massage gives us excellent results and prepares the way for resistance exercise to follow. The Nauheim baths are good. Babcock insists that in all cases of corpulence high tension exists in the abdominal vessels, requiring the persistent use of cathartics.

## CARDIAC ASTHMA

Dyspnea is one of the first and most persistent symptoms of cardiac insufficiency. It is not, however, solely due to the mechanical derangement. Pain and nervousness may interfere with respiration; but apart from these the dyspnea is always induced by exertion. As the heart grows weaker the dyspnea increases and is induced by continually slighter causes until it becomes constant. In addition, however, we have intense paroxysms which have passed under the name of asthma, but are now termed cardiac asthma. Typical attacks occur at night, on lying down, or during sleep. The resemblance to true asthma may be very close. Moist rales may be heard over the chest, and frothy or bloody mucus may be expectorated. The distress is agonizing. The face becomes blue and is covered with perspiration; the pulse is rapid, weak and irregular; the difficulty of inspiration is enormous. If the heart is examined during a paroxysm it is found to be dilated, the sounds weak and masked by moist rales. The attack may last for a few moments or for hours, and subside leaving the patient exhausted. These attacks are ascribed to a temporary weakness of the left ventricle and undue strength of the right, both contributing to cause excessive congestion of the lungs. The dyspnea is increased by pulmonary edema. If the patient has a weak left ventricle temporary excitement may induce an attack. Sexual ex-

itement seems especially liable to do this. The increased blood pressure caused by lying down may explain the occurrence of a paroxysm during sleep; or possibly it is due to inadequacy of respiration when not assisted by voluntary effort.

The treatment of cardiac as of essential asthma by narcotics must be condemned. Glonoin gives the quickest relief, and may be given gr. 1-250 every five minutes. Prolong the action by administering hyoscyamine, gr. 1-251 repeated every ten or fifteen minutes until the face flushes. Sustain the vital forces and the heart, and restore control over the respiratory nerves by strychnine arsenate, gr. 1-134 every half hour until pulse tone is restored; and you have the most effective treatment of the paroxysm, one directly indicated by the pathologic conditions. The treatment of the intervals is that called for by the underlying condition of the heart, and of the system at large. Autotoxemia is especially to be guarded against, since the toxin in the blood is certain to act most injuriously upon the points of lowest resistance, the diseased heart and the hypersensitive pulmonary nerve ends.

### CHEYNE-STOKES RESPIRATION

This occurs in paroxysms at regular intervals, alternating with normal respiration. It begins with a suspension of breathing; then respirations begin, slow and shallow, each succeeding one coming quicker and deeper, until the rate is singularly rapid and forcible, the dyspnea being great. In a few moments this begins to subside and the respirations die away into apnea, the chest being motionless. The same thing is repeated over and over. The time occupied by a cycle is uniform in the same case, but not in any two cases; it is usually less than one minute. Consciousness is unaffected as a rule. The pupils are contracted during apnea, dilated during dyspnea. Rhythmic change has been observed. The pulse is sometimes unaffected, at others disturbed. The tension is usually increased.

This phenomenon has been witnessed in a number of cerebral diseases, shock, uremia, alcoholism, opium poisoning and insanity; with lesions of the heart and great vessels, and in chronic nephritis. It is most frequent in diseases of the aorta and its valves. It has also been noticed in diphtheria, typhoid fever, pneumonia and other infectious maladies.

**Prognosis:**—It is a bad indication, usually heralding the approach of death, although sometimes this has been postponed for months after the development of the symptom. The best prognosis is naturally



when the phenomenon appears in the course of a disease not necessarily fatal, such as influenza. Babcock considers it less grave when occurring during sleep.

**Treatment:**—The management is that of the underlying disease. The symptom may be relieved by hypodermics of morphine, with or without atropine; but the value of this remedy has been disputed. Looking upon irregular motor manifestations as indicating a weakened control by the nerve centers, strychnine would be the physiologic remedy; and as it is usually indicated for the underlying disease and the general condition of the patient, it would seem at any rate to be worthy of a trial.

### BRADYCARDIA

This term designates an adult pulse of less than sixty to the minute. The pulse normally is sometimes less than sixty. Napoleon's was forty. Sometimes this is hereditary; occasionally this has been observed during hunger, and it is quite frequent in puerperal women. Allbutt has noted it in adults and children following sexual excess. Riegel has noted bradycardia during convalescence from pneumonia, diphtheria, typhoid fever, erysipelas and acute rheumatism. Sanson includes influenza. It has been noted also in chronic dyspepsia, gastric ulcer and cancer, and jundice; as well as esophageal cancer and typhlitis. It is met in emphysema and some diseases of the heart and great blood-vessels, especially the scleroses; in acute nephritis, uremia and hematuria, in poisoning from lead, tobacco, coffee, alcohol and digitalis; in diabetes, chlorosis and anemia; in apoplexy, epilepsy, brain tumors, disease of the medulla and cervical cord, paresis, melancholy and mania; in some skin diseases, genital affections, sunstroke, and in exhaustion from any cause.

Regnard says it may be caused by any chronic lesion causing irritation of any portion of the moderator apparatus of the heart.

In diseases of the circulatory apparatus bradycardia is of serious importance, usually indicating sclerotic degeneration. Death may occur in syncope or after very slight strain. It is therefore, an indication for careful examination of the heart.

### STOKES-ADAMS DISEASE

This term signifies a paroxysmal intensification of preëxisting bradycardia, with vertigo, syncope and epileptoid attacks.

It is most usual in elderly men. The pathology is obscure. Huchard attributes it to arteriosclerosis of the coronary arteries. Fatal cases,

however, have revealed no lesions to which the malady could be attributed. Other causes to which it has been attributed are: anemia, syphilis, dietary errors, indigestion and obstipation. Tripiier looked upon the disease as a form of epilepsy.

**Symptoms:**—We have first bradycardia and other disorders of the circulation, vertigo and syncope, epileptiform convulsions and disorders of respiration, the last being uncommon. The pulse is slow and regular during the attack, sinking to 20 or less. Vascular tension is great; the pulse does not respond to stimulants or to exercise. In two cases digitalis raised the pulse to fifty. Auscultation may detect a faint murmur during the pause. Feeble pulsations are noted in the right internal jugular vein, just above the clavicle, synchronous with the heart. Vertigo is present in all cases and is not relieved by lying down. Syncope lasts but a few seconds and is followed with a flush like that produced by glonoin. The pulse is absent during syncope. Epileptiform convulsions may accompany it, limited to the mouth, or one or more extremities. The paroxysms may occur at varying intervals, sometimes several in a day. Babcock describes the case of a young man who enjoyed immunity while on a vegetarian diet; his attacks were traceable to the intestinal canal, the urinary solids being reduced on the days on which attacks occurred, and increasing when they were absent. This pointed to autotoxemia as a cause of the attacks. Jaquet's observations were in harmony with this, the seizures disappearing when indigestion and constipation were remedied.

The diagnosis may be difficult when we have a vertigo and an increasing bradycardia. The addition of syncope and the convulsions completes the picture. There are periods of unconsciousness, the patient possibly falling, and we may find rigid arteries or evidences of disease of the heart. Occurring in a person much under forty, it is difficult to separate from epilepsy, but the slow pulse is not significant of the latter.

The prognosis is grave and uncertain. The underlying disease may determine the possibility of recovery.

**Treatment:**—Hitherto the treatment has not been satisfactory; in one anemic case inhalations of oxygen, with a suitable diet, were followed by recovery; in other cases oxygen failed. One of Stokes' cases found he could prevent or mitigate an attack by going on his hands and knees with his head hanging down. The most significant observations yet made are the improvement following the use of digitalis and the prevention of autotoxemia by proper attention to the diet and to the bowels.

Apocynin seems to be indicated here, as it acts smartly on the bowels and as a tonic to the heart.



## ANGINA PECTORIS

This term designates paroxysmal attacks of pain in the heart, of a neuralgic type, with a sense of constriction and impending death. This malady has been found in connection with every known disease of the heart and of the great vessels; but with no one of these diseases is it always present, nor is any one of them always present with angina. There are various grades of angina pectoris, varying from extreme mildness to extreme severity and corresponding danger. Perhaps the most frequent attendant of the severer form is sclerosis of the coronary arteries, especially when it interferes with the supply of blood to the heart; in fact, interference with the supply of blood for the nutrition of the heart has been held to constitute the essential pathologic condition causative of angina.

In ordinary circumstances the supply of blood may be sufficient, but when an unusual supply is required, or when emotion interferes with the ordinary supply, a paroxysm is induced. The pain is claimed to be curative in that, by placing the patient in a condition of enforced rest, the need for an extra supply subsides. This argument must appear to anyone who has felt or witnessed these agonizing attacks to be paltry and far-fetched. Huchard claimed that abnormal and excessive cardiac irritation always aroused a paroxysm.

Angina pectoris is a disease of men over sixty years of age, although it occurs exceptionally in much younger patients. Men are much more frequently affected, especially those who are particularly well fed. One of the writer's most marked cases occurred in a woman thirty-three years of age, in the last stages of pulmonary tuberculosis. Angina is sometimes hereditary. Gout, interstitial nephritis and other causes of atheroma are predisposing causes of angina. To these we may add syphilis, alcohol and tobacco.

The exciting causes of the severer form are anything that will suddenly raise vascular tension, such as sudden muscular effort, exposure to cold wind, exercise immediately after full meals, strong emotional excitement, a cold bath, sexual intercourse, flatulence, and in some individuals tobacco. Tea and coffee have been known to cause attacks. The milder cases, known as false angina, are, according to Huchard, never due to muscular exertion. They may occur during sleep, and may then be attributed to flatulence, chilling of the room, or getting into awkward positions.

**Symptoms:**—The patient may never have had any symptom referable to the heart; he is suddenly seized with an agonizing pain in the region of the heart, with a sense of oppression or weight, or of impending death.

The pain is agonizing; patients almost always describe it as if the heart were being crushed in the grasp of an iron hand. The duration of the paroxysm is short, though it is difficult to convince the patient of this. Nocturnal attacks are longer than those occurring by day, and more severe. Death has occurred with a first seizure. Usually the paroxysms tend to recur with greater frequency and severity; sometimes they become almost continuous. The pain runs along the intercostohumoral nerve to the inside of the left arm, down as far as the elbow in some cases. The patient may locate the pain under the upper part of the sternum. In severe attacks the face is pale gray or bluish, covered with cold sweat, the extremities and the tip of the nose are cold, the pulse small, tense and wiry. Speech is impossible and respiration is repressed. The pain may extend in any direction widely from the heart. The patient is usually motionless during the height of the paroxysm and sitting or standing up. The seizure usually subsides as suddenly as it occurs, leaving a sense of numbness, soreness or motor paresis of the arm.

The course is exceedingly variable, and paroxysms may recur during many years. Gardner has described a form in which the other symptoms are present, but no pain.

**Diagnosis:**—Two features are essential to the diagnosis of angina pectoris—the crushing sensation and that of impending death. We may have intercostal neuralgias extending into the left shoulder and arm, which are not anginas, and may never develop into angina, although they occasionally do. Usually the tender points of Valleix distinguish these. They are more frequent in women and in anemic, neurotic persons. They occur in much younger persons than true angina. They are also unattended with sclerotic or other disease of the heart or great vessels. In many cases, we have such attacks which are not true angina, in women with large hearts who have long been autotoxemic. If the patient is able to walk, sit, lie down or moan during the paroxysm, it is probably not a true angina. Nevertheless there are cases on the borderline between the two groups, and it is not impossible that the mildest case may in time develop into the graver malady.

**Prognosis:**—Angina pectoris is a grave disease, the possibility of sudden death in a paroxysm always being present. It is impossible to predict the probable duration of life. Attacks recurring from slighter cause, with greater severity and frequency, are ominous. Nevertheless, the malady is by no means altogether hopeless.

**Treatment:**—Recognizing the paroxysm as a condition of intense vasomotor spasm, the remedy is glonoin. Patients liable to this disease should carry a supply of these granules, loose in the vest pocket, so that



they can be taken instantly. The granules do not deteriorate. The remedy is absorbed from the mouth and its effects are then more rapidly exerted than when taken hypodermically. Gr. 1-250 can be used at first, and repeated every five minutes until the spasm relaxes. If this prove insufficient the dose should be increased until the desired effect is obtained. Ordinarily the spasm does not last longer than the brief period during which the action of glonoin endures; but if the paroxysm be prolonged hyoscyamine should be added in similar doses. It is better to have the two combined in a single granule. When thus administered the effect of hyoscyamine is manifested more promptly than when given alone. The clinician who looks upon spasm as invariably indicating a weakening or loss of control by the nervous system over the part involved, will add to the above combination strychnine arsenate in similar doses. These minute doses of strychnine aid in the restoration of nervous control, while the arsenic is believed to favorably influence the nutrition of the heart.

The treatment of the intervals, however, is another matter, and must depend in great measure upon the cardiovascular disease underlying the malady. The writer has for many years been accustomed to administer that powerful absorbent and alterative arsenic iodide, in doses of gr. 1-67 four times a day, to all cases of arteriosclerosis, continuing the remedy as a rule for a year or more. In the meantime the utmost pains are taken to enforce an exact hygienic regime, to prevent autotoxemia and sustain the nutrition of these patients at the highest point, without overdoing the matter. During more than fifteen years every patient thus treated has manifested a slow but steady improvement, the paroxysms becoming less frequent and less severe, the circulatory conditions improving, the patient picking up hope and gradually acquiring a firm conviction of his own well-being. I cannot persuade myself that the treatment is useless, and that I have been guilty of self-deception in believing that it has materially benefited my patients.

Since the paroxysm is a vasomotor spasm it may be of importance for the reader to recollect that in the absence of glonoin and hyoscyamine, there are other remedies that relax such spasm. Inhalations of amyl nitrite do this even more quickly than glonoin, but the pearls of amyl are not so handy as the granules of glonoin. Inhalations of ether also give relief, but Anstie gave his warning that a chloroform inhalation was apt to be followed by instant death. Hoffman's anodyne, sweet spirits of niter, alcohol, ammonia, camphor, capsicum, pepper, any volatile oil, in fact, a dose of any remedy that is "hot enough to bring tears to the eyes" will relax such spasms. Obviously the remedy should not be diluted more than is absolutely necessary. Hot mustard foot- and whole

baths, and sinapisms over the pneumogastric nerve in the neck, have some effect in this way and could be utilized in the absence of more effective remedies.

During the intervals the patient should be carefully trained in the means of avoiding the exciting causes of such attacks. Cold winds are to be avoided, as well as sudden exertions and emotions; the hands, feet and head must be kept warm; in fact, the patient necessarily becomes a valetudinarian, eternal vigilance being essential to the continuance of his life, at least until the treatment above mentioned has materially modified the causal affection. If heart-tonics are required it is better to employ those which, like strophanthin, have the smallest vasoconstrictor effect.

### SYPHILIS OF THE MYOCARDIUM

There is a form of fatty degeneration caused by syphilis, indistinguishable from that due to other causes. The interstitial myocarditis accompanying syphilitic arteriosclerosis may be specific or not. Gummata are rare.

If any symptoms are manifest they are indistinguishable from the same malady as caused by other affections. The heart-action is irregular. Semmola insisted on the presence of arrhythmia and rapidity of the pulse. There may be a sense of distress or even pain about the heart, or dyspnea.

When evidences of cardiac derangement appear in persons with clear syphilitic history, the specific nature of the lesions may be inferred, though this is not positive. If the patient is comparatively young, under 50, with no history of rheumatism or other infection capable of originating the heart malady, the inference is strengthened and the beneficial effects of antisyphilitic treatment go far to confirm the diagnosis.

The prognosis is good enough to make it a matter of congratulation to any one showing a heart-lesion, if a syphilitic infection can be assigned as its cause. But if the disease is not suspected and treated before structural damage has been done, it must be noted that mercury does not create new tissues to replace those destroyed.

As it is essential to check the progress of the malady as quickly as possible, to stop the destruction of tissue, the speediest of remedies are indicated. Hence we urge the use of mercury biniodide gr. 3-67, iodoform and phytolaccin each gr. 1-2, and arsenic iodide gr. 1-67, every four hours until irritation of the eyelids indicates full desirable effect, then less frequently, to sustain the effect. From this combination much better effects can be secured than from potassium iodide or any mercurial salt, alone or together. The heart-symptoms may require also tonics for



temporary use, and the other treatment suitable to the case, with iron for resultant anemia, hydragogs for oppression or dropsy, etc.

### MYOCARDIAL TUMORS

Tuberculosis of the myocardium may accompany that malady elsewhere, appearing in the form of miliary nodules or as an interstitial myocarditis. Hydatid cysts and other parasites have been found, as rare pathologic curiosities. Cancer rarely occurs, lipoma and fibroma still more rarely. Even secondary carcinomatous growths are uncommon. There are no distinctive symptoms.

### ATROPHY OF THE HEART

Atrophy of the left ventricle attends extreme forms of mitral stenosis, and aortic disease where the supply of blood to the coronary arteries is deficient. The heart atrophies as age comes on; it is sometimes congenitally small, and usually smallness of the genitalia is then also present.

The heart is brownish or yellowish, wrinkled, tough, the fibers shrunk and stained by pigment. Fat is absent.

The heart atrophies in marasmus, from phthisis, cancer, diabetes, chronic suppuration, etc. To the symptoms of the causal malady may be added those of weakness of the heart, a weak, rapid pulse of small volume, feeble impulse and sounds, without stasis but a decided tendency to syncope on rising. The reduced size of the heart may be demonstrated by percussion or by the x-ray. The prognosis is that of the cause. Fatal syncope may occur at any time, especially when the patient rises to urinate.

This is one of the rare cases in which moderate doses of alcohol are useful, relaxing vascular tension and favoring a better flow of nutritive blood to the heart. Persons so affected should have wine by their bedside and take a small dose a few minutes before rising to urinate. The heart-tonics are unsafe if given in full doses, but minute doses of cactus or sparteine seem to favor the nutrition of the heart. The diet should be small in bulk, rich in nutritious value, and with an excess of proteids unless otherwise contraindicated; while artificial digestives should be used freely. Carefully arranged exercises may assist in increasing the growth of a small heart, in the young. Elderly patients must be warned of the imminent danger ran by sexual indulgence, during which many of these cases end in death.

The writer has recently heard of the death of a former patient at the age of 92, in whom he diagnosed cardiac atrophy twenty years ago.

## CARDIAC THROMBI

A few cases have been recorded in which pedunculated thrombi have been found in the heart, usually in the auricles, especially the left. Still more rarely disconnected balls of fibrin have been discovered, post mortem. These result from deposits of fibrin upon a nucleus, probably of coagulated blood. They are more common in women, and those who have disease obstructing the auriculoventricular valves.

The symptoms are those of extreme obstruction of the affected valve, the dyspnea continuing during rest. Cough and cyanosis are prominent. The abdominal viscera are congested, urine scanty and albuminous, dropsy present. The pulse is strikingly small and feeble, this and the venous engorgement being out of proportion to the valvular lesion. In all his three cases von Ziemssen found gangrene of a circumscribed area on the foot, with edema and cadaveric coldness of the extremities. He attributed this to thrombosis in the scantily-filled arteries. The murmur characteristic of the valvular affection is apt to be lost.

No diagnosis has yet been made during the life of the patient. Von Ziemssen requires for diagnosis the demonstration of a preëxistent mitral stenosis, excessive evidences of obstruction, and the gangrene described.

The prognosis is bad.

As yet the surgeons have not removed any cardiac thrombi.

## DEXTROCARDIA

When this occurs congenitally the other viscera are usually also transposed. No symptoms result from such transposition if alone.

When the heart is pushed into the right chest the vessels attached to the base are twisted or stretched. Obstruction is likely. The displacement is sometimes caused by pneumothorax or pleurisy, and if the heart contracts adhesions it may be retained in its new position. The lung fails to expand. Injury of the lung and tuberculosis may be the primary causes.

The symptoms are those of the circulatory obstruction, cyanosis, dyspnea, weak rapid pulse, palpitation, scanty urine, and in time dropsies with venous engorgement. In extreme cases the spine becomes curved to meet the vacuum. The diagnosis is not difficult. The prognosis depends largely on the causal malady, and the degree of obstruction to the circulation.

Just why the surgeons have not freed the heart from its encumbrances and restored it to its natural location is difficult to comprehend.



### CONGENITAL IMPERFECTIONS

Imperfection of the septum cordis is attributed to narrowing of one of the great arteries by which a stream of blood is diverted to the other side of the heart. The usually assigned cause is fatal endocarditis from infectious disease of the mother, or due to a tendency to degeneracy.

An open foramen ovale may cause no symptoms, and be compatible with long life, especially if there is little or no contraction of the aorta or pulmonary artery. But if the latter is narrowed cyanosis will be evident. Such children are ill-developed, backward, sluggish, stunted, their profile is prognathous, the sternum projects, their fingers and toes club. Cyanosis is most evident in the lips and other parts naturally red. It is worse on exertion. The blood is of high specific gravity and contains an excess of red cells and hemoglobin, sometimes also of white cells. These patients are very susceptible to cold. Dyspnea attends venous stasis, or is disproportionately manifested.

Physical examination may detect pulmonary valve or artery disease. The pulse is of greater volume when the septum allows an additional quantity to flow into the left heart. If the pulses of the lower extremities are larger proportionally than those of the upper, Botalli's duct remains open (Kolisko). Percussion indicates enlargement of the right ventricle. In some but not all cases there is a loud systolic murmur most distinct at the base, not limited to any valvular area.

The diagnosis is evident from the history. The prognosis is bad as the pulmonary obstruction is decided. Few cases live to maturity. When compensation begins to fail it is not easily restored. The treatment is symptomatic.

### CARDIAC NEUROSES

We find in some cases disordered heart-action, pain and other abnormal sensations about the heart without perceptible organic disease. These may be due to some as yet undiscovered affection of the heart structure, to maladies of other parts, such as the nerve centers, or to conditions of the blood, like autotoxemia.

**Palpitation:**—We find in this affection the heart beating more rapidly and forcibly than normal; the attacks occur suddenly, the heart thumping against the ribs, greatly alarming the patient. The pulse may be but slightly above normal or double its usual rate. It may be regular, irregular or intermittent. Intermittence may occasion a sinking feeling, a powerful throb following. The arteries in the neck or abdomen pulsate; the radial pulse varies in rate and force. The face may be flushed or

pale, the extremities cold. Pain may accompany or follow the paroxysms, or an indescribable sense of distress about the heart. Some patients complain of feeling their arteries beat throughout the body. These cases are frequently associated with hysteria, with sexual and other forms of neurasthenia, and almost always there is present digestive disorder of some kind.

**Pseudoangina:**—Pains in the region of the heart are very common in neurotics, who are usually apprehensive of heart disease. The weather often appears to influence these pains, or they may follow exercise involving the muscles of the chest. The anxiety usually present is probably psychic. Palpitation, cold extremities and other evidences of disturbed vasomotor equilibrium may also be present. There is no resemblance between these pains and true angina pectoris, except perhaps they both hurt. No organic disease of the heart is to be found. The intercostal nerves may be affected, or some other nerves, or the starting point of the difficulty may be in almost any part of the body, and passing along the reflex paths manifest itself by pain about the heart. Nevertheless, while no disease may be demonstrated in the latter organ, it is well known that reflex disturbances usually appear at the point of lowest resistance. Hence we need not be surprised if in the course of time organic disease may become demonstrable in this organ.

The reflex angina is the most common form, and in the abdomen we find the majority of the sources of the irritation. Tobacco is a common cause. The pain may be agonizing, and be attended by a sense of apprehension; the pain may radiate to the left arm, which may be cold and numb; sinking sensation and even a clutching at the heart may be felt. In cases of the vasomotor type the face is pale and anxious, extremities cold, skin clammy, the pulse weak, slow and irregular; but the patient does not as in true angina assume an erect, motionless attitude, but moves about and moans or cries. Catalepsy occasionally, however, occurs. The attacks occur suddenly, often at night, and may be preceded by chilliness, restlessness, or general discomfort; regular periodicity may be noted. The pain may endure for several hours, leaving the patient exhausted. Many recurrences have been noted. In reflex cases the neuralgic type is pronounced. The vasomotor form may be excited by cold. A toxic form is very uncommon. Vertigo, pallor, syncope, precordial anxiety, a small tense pulse, cold extremities and perspiration characterize tobacco cases, with the other symptoms of nicotine poisoning.

**Etiology:**—We have as a predisposing cause a mental and nervous equilibrium easily destroyed. In many cases there may be said to be



a leakage of nerve force occasioning a shortage in its supply. An imperfect organ, like a defective eye, may acquire the power of attracting to itself an abnormal supply of nerve force, and some other organ being unable to retain its share has to do without it. We call the latter the area of least resistance and here we have manifestations of disease. The prominence of emotional temperament renders women the most frequent victims of this affection, but it frequently occurs in men, in both sexes attacking individuals during early adult life. The change of life is another period in which attacks are common. Sometimes the malady dates from an emotional shock; at other times it occurs after a full meal, or from autotoxemia. Mental influences have, however, much to do with the occurrence, and patients who are expecting a paroxysm will generally have it.

**Diagnosis:**—We find the history of a neurotic, often hereditary, no organic heart-disease discoverable; the age often much less than that at which sclerosis is manifested, and no history of rheumatism or infectious maladies determining endocarditis. The influence of the other causes mentioned may be demonstrated in special cases. The x-ray may be required to satisfy the patient that no organic disease exists. Head demonstrated the presence of certain tender areas corresponding to the distribution of the fourth and fifth intercostal nerves; these are: near the left nipple, on the fifth rib or the interspace above or below it, on the fourth costal cartilage or the interspace below it, at the sternal margin, and over the ensiform cartilage. Painful points are also to be found near the inferior angle of the scapula. These attend functional and organic disorders of the stomach. In diseases of the thoracic organs similar tender areas are found higher up.

**Prognosis:**—This depends on the underlying condition. The cases are apt to be chronic, they are difficult of management, and the patients are exceedingly likely to change physicians whenever, as is usual, they feel neglected.

**Treatment:**—The underlying condition requires its own treatment. The utmost pains should be taken in these cases to trace the malady to its source. It may be found in autotoxemia, in distant and usually unsuspected sources of reflex disturbance or rather of the leakage of nerve force, as in the case of an imperfect eye, which is called upon to do so much work that the defect is intensified. In a number of cases the cause will elude us unless we inquire into the sexual realm. Examination may detect abnormalities in the sexual apparatus, and these however slight and inconsequent they may appear should be remedied. It is astonishing what brilliant cures occasionally result from the removal

of such sources of irritation. The sexual life should also be most carefully investigated, for sometimes sexual excess, much more frequently sex hunger, underlies these manifestations. The paroxysm may be relieved most quickly by the combination advised in treating angina—glonoin, hyoscyamine and strychnine; the bowels should of course be emptied and fecal poisoning stopped. The physician should not rush off to digitalis the moment the idea of "heart-disease" flashes across his mind. The causal indications treated, small doses of the milder heart tonics, such as cactus or cypripedin, frequently afford great relief by aiding in the restoration of central control; but if inhibition is evidently deficient, we may with advantage administer aconitine enough to discipline the unruly rebel; or gelseminine if sexual erethism is manifest. A few small doses of the valerianate of caffeine or of zinc usually restore self-control to the patient and allay apprehension. Ice or mustard over the pneumogastric nerve in the neck relieves pain and subdues spasm. There is no real need for either opiates or alcohol in these cases and with such patients there is an enormous danger of the formation of a drug habit.

## TACHYCARDIA

Sometimes tachycardia occurs without any evidence of cardiac disease. No anatomic changes characteristic of the malady have been detected. One observer attributes the affection to paresis of the vagus, another to irritation of the sympathetic, a third to both. The causation is obscure. Most cases occur in adults. It seems sometimes to be hereditary. Among exciting causes have been noted; a blow on the chest, strong emotion, and sudden strong physical exertion. Digestive difficulties have also preceded the attacks. Romberg says the disease may be reflex.

To establish the existence of such a case the apparently healthy heart must beat at least 160 times a minute, and the attack must be sudden and abrupt in onset and in ending. The pulse has run up to 300 a minute. It is small and thready, generally regular in rhythm. The face may be pale or flushed; there may be a sense of oppression about the heart, with pain, numbness or tingling of the arm, and vertigo. Great alarm is occasioned by the attacks. In long attacks the circulation is not sustained, the heart becomes distended, the venous system engorged, with cyanosis and jugular pulsation. The lungs are congested. There may be slight edema and albuminuria. The heart sounds are feeble, the first sound at the apex almost inaudible. However, it is but rarely that the paroxysm endures long enough to occasion such symptoms. On subsiding the patient is left weak and apprehensive. The tachycardia



persists even during sleep. The recurrences are not regularly periodic. The attacks vary in duration from a few moments to several weeks.

**Diagnosis:**—The diagnostic question is as to whether the affection is essential or accompanies some organic disease of the heart. The malady does not appear to endanger life, unless in the aged and feeble.

**Treatment:**—Digitalis has been tried and proved wanting. Some patients are able to check a paroxysm by taking a full inspiration, followed by a forcible expiration aided by compressing the abdomen. The treatment during the intervals depends strictly on what the physician finds to treat.

### III. DISEASES OF THE ARTERIES

#### ARTERIOSCLEROSIS

The latest accepted theory in regard to this disease is that of Thoma. The middle arterial coat relaxes with consequent slowing of the blood-stream. Connective tissue hyperplasia occurs under the endothelium. The same process takes place when a volume of blood but partly fills the vessels. The process may occur in nodules or be diffuse. In the former light-colored patches project into the vessels; in the diffuse form the wall is stiff, and dilated with projecting zones and patches on the endothelium. As the patient ages the arteries become stiff, tortuous and dilated. Chalky plates project into the vessels, or the diseased patches break down into ulcers. The new connective tissues degenerate into hyaline masses with a fine granular detritus containing fat drops. These discharge into the blood-current. Lime deposited in others forms projecting plates, and the artery may be transformed into a chalky tube. Degeneration of the middle coat occurs, and the weakened vessel dilates. The muscle fibers become atrophied and degenerated, the elastic elements disappearing. The outer coat is infiltrated with round cells. In the smaller arteries the lumen is so obstructed as to seriously interfere with the circulation. Large vessels become dilated. The disease is not manifested equally in all arteries, being most frequent in the ulnar and anterior tibial; least so in the brachial. Nodules are most frequent in vessels whose course is crooked, or which give off branches at a sharp angle. Parts subjected to the greatest strain are most affected by the disease. Similar lesions are found in the heart, kidneys and livers.

**Etiology:**—That this disease occurs most frequently in advanced years, is because the strain upon the blood-vessels to which it is due has then be operative long enough to give rise to the disease. Men are more

frequently affected because their occupations and habits render them more liable to the disease than women. Arteriosclerosis develops in men whose occupation necessitates unusually severe physical exertion, especially if such work is begun in early life. Syphilis is a very common cause of this disease; chronic lead-poisoning, alcoholism and gout are also established causative factors. The excessive use of tobacco is blamed by many. Romberg finds the disease common in neurasthenics. When vascular tension has been abnormally high throughout the body the disease is general. Corpulent persons of sedentary habits are first affected with sclerosis in the splenic, hepatic and superior mesenteric arteries, where blood-pressure is habitually high. In workmen the disease is attributed to the alternation of strain and relaxation. In brain-workers the disease is apt to occur in the cerebral vessels. Hypertrophy of the heart increasing the pressure in the coronary arteries, sclerosis is common in these vessels. This may explain also the frequency of angina pectoris with coronary sclerosis in modern business men (Babcock). Persons with mitral disease or chronic phthisis have sclerosis of the pulmonary artery. In diabetes the affection is general.

**Symptoms:**—The disease is long latent. Sometimes the affection is manifested by renal inadequacy, cardiovascular disorder, or disturbance in the circulation of the brain, the extremities, the digestive organs or the heart. When interstitial nephritis lessens the supply of blood to the kidneys, sclerosis occurs in the renal arteries. It is easier to comprehend why in most cases sclerosis is the primary causal affection. The quantity of urine is increased, its specific gravity is low, as the kidney contracts the excretion of urine becomes smaller. The general vascular tension rises, sclerosis appears in the heart and elsewhere, hypertrophy follows with incompetence in time. In other cases, dyspnea with weakening heart precedes renal symptoms.

In another form the symptoms depend principally upon the arterial disease. The vessels are stiff, tortuous and beaded; the pulse small and weak; the veins project; the urine is scanty and thin, with a very few casts and a trace of albumin; debility increases, appetite and digestion weaken, the ankles swell, the patient wastes, loses color and at last dies from general debility. Nutrition suffers, because the arteries neither receive nor transmit the full supply of blood, which collects usually in the veins.

Interference with the blood-supply shows itself in the disturbed function of the part most affected. If it be the cerebral arteries the mental faculties are impaired, the patient complains of headache and vertigo, especially on arising after lying down; and debility increases. These symptoms indicate partial cerebral anemia. Rarely this may occasion



epilepsy, developing late in life. It is also the most common cause of apoplexy, occurring from the rupture of a minute aneurism at the site of a sclerotic ulcer.

Occurring in the medullary arteries sclerosis is a cause of the Stokes-Adams disease. Affecting the arteries of the legs it gives rise to various abnormal sensations, disorders of motion, such as intermittent claudication, cramps, etc.; to vasomotor disturbances; trophic disorders, and if a vessel is totally obliterated, to gangrene of the parts supplied by it. Many of these disturbances appear only when a demand is made for more blood than when the part is at rest. From this cause we have inflammatory symptoms, senile gangrene, local necrosis and the symptoms of Raynaud's disease occasionally developing.

Interference with the circulation through the coronary arteries leads to angina pectoris, degeneration of the heart-muscle and general cardiac incompetence; while the diffuse form of the disease, by increasing vascular tension, induces hypertrophy of the left ventricle. It seems to be sclerosis of the abdominal arteries which especially causes general hypertrophy of the heart.

In still another form, especially appearing in working men, the disease is associated with chronic bronchitis and emphysema; the urine is light and slightly albuminous; the right hypertrophied.

The course of the disease is generally exceedingly slow.

**Physical Signs:**—In one type the patients are corpulent, with flabby abdomen, in another thin, poorly nourished, with tortuous arteries plainly pulsating; the veins are prominent. The arteries are stiff and thick, not compressible; tortuous, beady, sometimes studded with little aneurisms. The arterial thrill is easily elicited; hypertrophy may increase the dull area of the heart. The second sound in the aortic area is even more intensified than is usual with advancing age; it is apt to be metallic; if the valve is implicated we have the appropriate murmur.

**Diagnosis:**—When the diseased artery can be felt the diagnosis is easy; but when the disease is confined to the deeper arteries the diagnosis requires a careful study of the case. The disease is manifested early, however, by pulsation and tortuosity of the retinal arteries, and other ocular changes. The disease in the aorta may be indicated by the ringing metallic character of the aortic second sound. Stiffened radial arteries in a corpulent man, whose dyspnea on exertion cannot be explained by the condition of his heart, point to sclerosis of the abdominal vessels. A slow pulse with high tension and hypertrophy in such a person, if of sedentary habits, are significant. The development of feebleness of the heart after slight extra exertion is also indicative. The diagnosis,

however, is often inferential, as fatty overgrowth may occasion closely analogous symptoms, and occurs in similar cases. We may guess at the existence of sclerosis of the pulmonary artery when an elderly working man, with stiffened arteries and right ventricle hypertrophied, suffers from chronic bronchitis and emphysema.

**Prognosis:**—It depends upon the extent of the disease and the consequent interference with the circulation. The disease is progressive, admittedly incurable, but may be checked by suitable treatment. The more serious the interference with the nutrition of any part the graver is the prognosis.

**Treatment:**—Prophylaxis involves the early recognition of the presence of the disease and such a regulation of the habits, diet, exercise and excretion as will lessen undue vascular strain and regulate vascular pressure. When the profession learns to appreciate the value of veratrine the condition known as high tension will be less dreaded. The corpulent abdomen is to be reduced, the food restricted to the needs in quality and quantity, excesses in business are to be forbidden, and exercise and recreation prescribed in doses suited to the case. As a rule foods rich in lime, extractives and volatile oils, are objectionable. The patient must, however, be restrained if in his enthusiasm for reform he is apt to go too far and reform himself off the face of the earth. The habits of fifty years cannot be ruthlessly and radically altered like those of fifteen. We need scarcely say that autotoxemia is to be prevented, and the bowels regulated with the utmost care; no injurious element must be allowed to circulate in the blood; no more work must be put upon an impaired heart, kidney or liver, than is absolutely unavoidable.

The writer has for many years treated arteriosclerosis medicinally by the administration of the iodide of arsenic. This is one of the most active preparations known of arsenic and of iodine. Both these elements tending to cause irritation of the eyelids, we have in this a ready means of judging when full desirable effects of the drugs are being secured. Few patients will bear more than a milligram of this salt four times a day, given in solution, an hour before each meal and on going to bed. If after a week's administration the patient shows no signs of the drug, each dose may be gradually enlarged; but on the first sign of irritation of the lids the dose should be lessened until the irritation disappears; and the remedy continued as closely as possible to the irritation point without actually touching it. The remedy should be continued for at least a year. The explanation of its action is as follows: The influence of a remedy may be carried as far as extends the circulation hemic or lymphatic; a part at least of the disease is still intravascular, and this



we may reasonably expect to influence by drugs carried in the circulation. How much of the disease is intravascular we have no means of knowing, unless it may be by noting the effects of such treatment. Under the influence of this remedy it has been my good fortune to note the cessation of further extension of the disease and the subsidence of a certain part of the developed symptoms. I may say that the treatment also has invariably won the confidence of the patient and that no difficulty has been experienced in inducing him or her to persist in the treatment as long as it has been deemed advisable. The reason the benefits of such treatment have not been recognized generally by the profession, is comprehensible. The union of an absorbent like iodine, in its most potent form, with a remedy like arsenic which we believe favorably affects the nutrition of the circulatory tissues, is a rather nice application for these days, when drug treatment generally is so heartily despised; and the physician must have faith in the reasoning on which he founds the use of a drug, or he will not have the patience to persist in it for a year, and await the slow progress which alone can be depended upon to secure a cure in a disease whose development is as slow as this. The writer has in mind now the case of a lady, then seventy-three years of age, with marked symptoms of arteriosclerosis, including a perfect senile ring. She was treated as above described fifteen years ago, and remains healthy and hearty to this day, enjoying life, with no return of the serious symptoms which then presented themselves.

The symptomatic treatment consists especially in remedies, hygienic and medicinal, for the cardiac insufficiency. Strophanthin is probably the best heart-tonic. I have succeeded better in the use of this class of agents whenever there was coldness of the skin, indicating cutaneous vasomotor spasm, by adding atropine; or when the vascular tension was universally high by uniting veratrine to the heart-tonic administered. The diatetic regime and the other hygienic measures indicated are of such immense importance that here if anywhere the practitioner is pardonable for saying little as to drug treatment in order not to weaken the effect of his injunctions as to regulation of the habits. The union of high vascular tension with sclerosis and feeble or failing heart, presents peculiar difficulties to the therapist; and sometimes the most effective drug combination can only be ascertained by experiment.

## ACUTE AORTITIS

This malady occasionally accompanies acute endocarditis. Only in France has the disease been detected independently. The inflamed aorta

is dilated, the inner coat roughened by minute thrombi, which when swept into the current cause embolism. The process is too nearly identical with that occurring in acute endocarditis to require separate description. If ulceration occurs an opening may be made from the aorta into an auricle, a neighboring vessel or the pericardium. The disease may be an extension from the endocardium or may possibly occur independently in the course of an acute eruptive fever or other infection.

The malady is usually latent or overlooked. The symptoms can scarcely be distinguished from those of endocarditis. The pulse, in independent cases, would not be as weak as in the latter. Pain is felt under the manubrium, down the spine and sometimes in the left shoulder and arm. Oppression and anxiety may be felt; tenderness may be present in the intercostal spaces, to the left of the manubrium. Undue throbbing of the right subclavian has been noted. Difficulty on swallowing, cough and digestive disturbance, sometimes occur.

The physical signs are indefinite. The right subclavian artery may pulsate more strongly than the left. The diagnosis is generally a matter of conjecture. When the pain resembles that of angina it differs from that disease in being persistent; the heart-sounds are normal, and the area of cardiac dullness is not enlarged as in endocarditis.

The prognosis is bad. Embolism renders it still worse. Perforation or rupture of the aorta is possible.

When the disease is suspected the patient must be strictly confined to bed, and his strength sustained by scientific feeding. Pain may be relieved by morphine, hot or cold applications; vascular pressure should be depressed as far as it is possible by the use of veratrine; and other indications met as they arrive.

## INFLAMMATION OF OTHER ARTERIES

Inflammation of single arteries may occur as an extension of disease from surrounding parts or from embolism. The usual infiltration takes place, the endothelium swelling, connective tissue developing underneath it. Embolism is followed by thrombosis, the mass becoming organized and obliterating the vessel, unless the embolus is septic, when an abscess results.

No symptoms can be recognized unless in case of embolism, when an infarction is formed. When the vessel is occluded there may be, possibly, evidence of the disturbed circulation. Embolisms are denoted by pain, suddenly developing, with the coldness, numbness and cyanosis indicative of obstructed circulation. The physical signs are those of local



inflammation—heat, tenderness, pain, pitting on pressure and hardness. The diagnosis is made by the history and local symptoms. The prognosis depends upon the cause. When possible the affected part should be elevated, kept at rest and hot or cold applications made, while the bowels are kept clear and aseptic, and the patient's strength carefully maintained. Abscesses should be promptly evacuated when within reach.

### SYPHILITIC ARTERITIS

When syphilis infects the arteries it occasions inflammation in patches, especially in the brain; these are grayish white or translucent. Sometimes the vessel is obliterated, a gray cord remaining. In any case the vessel is narrowed and unless quite large is occluded. Small gummata form in the middle coat, replaced in time by cicatricial nodules. As these contract they cause pouchings of the inner coat, which are highly significant in the diagnosis. These may form the beginning of aneurisms. Constrictions are also formed by fibrous tissue developing in the outer and inner coats. The affection is most common in the cerebral arteries; next in the aorta and coronary arteries. It occurs in the tertiary period.

Developing in the brain this malady causes obstruction of the circulation and symptoms of acute softening, loss of memory, vertigo, headache, epileptiform convulsions and mental confusion, sometimes followed by general paresis. In the aorta it causes sclerosis or aneurism; in the coronary arteries it causes angina pectoris; occurring anywhere else the symptoms are those of the obstructed circulation.

The diagnosis depends upon the history of the infection to which the lesions may be attributed. The prognosis is bad, because the damage is usually done before the disease is recognized and the patient placed upon proper treatment. The treatment is that of syphilis of the heart, already described.

### ENDARTERITIS OBLITERANS

We will not spend much time over this rare affection. It usually occurs in the smaller arteries of the foot or leg, in which the vessels are bound firmly together by a tough fibrous mass; the artery is converted into a firm cord, its lumen being occupied with a wide-meshed tissue. The process commences with the arterioles and may extend up as far as the femoral artery. The inner coat is hyperplastic, with new-formed connective tissue, with which is a delicate, thread-like intercellular substance; in this blood-vessels appear.

The cause is unknown. It is more frequent in men, attacking the young and previously healthy; it may invade a single artery of the limb. The patient may have for years complained of pains in the limbs followed by paresthesia, numbness, formication, etc. At first the pain is relieved by rest, but as it increases the patient finds it impossible to use the limb, which feels heavy, causing lameness. When the artery is blocked gangrene occurs in the area supplied by the vessel. It spreads upward rapidly, and unless promptly removed the patient dies of sepsis. The disease is progressive. The diagnosis is difficult in the early stage and can only be guessed at until the artery has been obliterated. We then have the absence of pulsation in it, with cord-like rigidity. This disease is more frequent before thirty; sclerosis after fifty. This is local, the latter more general. Gangrene develops from sclerosis in both legs in time; Reynaud's disease is most frequent in still younger subjects, begins abruptly, and the parts affected are anesthetic. They are not rigid, nor are the vessels pulseless. The prognosis is bad, the malady never being recognized until it has proved destructive. No treatment has been evolved beyond the relief of symptoms, and surgical intervention at the earliest occurrence of gangrene.

For information upon periarteritis nodosa, stenosis of the aorta and the pulmonary artery, and congenital smallness of the arterial system, the reader is referred to Babcock's and other classic treatises.

## ANEURISM OF THE THORACIC AORTA

Aneurisms are classically divided into true, dissecting and false. The latter term describes a collection of blood that has escaped from an artery into the surrounding tissues, forming a hematoma. In a dissecting aneurism the inner coat is torn and the blood burrows between it and the middle coat, dissecting up the inner coat. Sometimes it again opens through it and the blood is discharged again into the vessel. In a true aneurism all the coats of the artery are dilated and form the coats of the aneurism. The dilatation may be fusiform or sacculate. In the former the entire vessel is dilated, in the latter only a part of its circumference gives way. The latter is the more common. As the aneurism enlarges the inner coat is lost, the muscular fibers of the middle coat degenerate, while the elastic elements become granular. This coat also may disappear leaving the wall of the aneurism composed only of the thickened, infiltrated adventitia. The opening communicating with the aorta is small as compared with the sac. In the latter we find layers of light fibrin, covered with later deposits which are redder and less firm in texture. In this



way the cavity may in time be completely filled with coagula. While this may be termed a natural cure, the degeneration of the walls of the artery which caused the original aneurism will probably cause others, so that multiple aneurisms are not uncommon. The size may vary from that of a nut to that of a man's head; the shape of the larger aneurisms being irregular. All the structures compressed by the growing mass are affected by it.

**Etiology:**—Arteriosclerosis, degeneration of the arterial walls, is the common cause, the coats giving way during the period of primary weakness before the fibrous hyperplasia has reinforced the vessel. Syphilis is also a cause of degeneration and of aneurism. The latter is rare before the 40th year. Men are the more liable, as more subject to the predisposing causes and to muscular strain. Alcoholism tends to favor the degenerative processes, as well as to increase the liability to syphilis. Muscular strain and traumatism can only affect an artery previously weakened by disease. Ulcerative endocarditis causing embolism usually accounts for aneurisms of peripheral vessels.

**Symptoms:**—While small the aneurism may not cause enough trouble to attract attention. If it develops close to the aorta it may rupture into the pericardium and cause sudden death. In many cases the symptoms are indefinite. Others afford unmistakable evidences. These are due to the pressure of the enlarging sac upon the structures with which it comes in contact.

Pain occurs early and constantly. If the growth of the tumor is toward the sternum the pain is early, constant, neuralgic, sharp and lancinating, or dull and aching, boring, grinding, cutting, burning, etc. It may be radiated along the intercostal nerves to the chest, neck, arms, etc. Tender areas may be found along the left of the sternum. Less pain is occasioned by growth inwardly, the pain is duller and less diffused, but dyspnea is caused by pressure on the bronchi. Besides the constant pain there are periods of severer suffering, when the patient exerts himself or assumes some certain attitude, which probably causes pressure upon a sensitive point. Pain arising within the sac may be increased by a rise in the vascular tension, pressing upon a sensitive sac wall. Relief ensues when the intrinsic pressure is relieved by escape from some surrounding constricting tissue.

Dyspnea results from pressure on the bronchi, trachea or lung. Irritation of a recurrent laryngeal nerve gives rise to distressing paroxysms of laryngeal spasm. The esophagus is apt to be simultaneously affected. Stridor often attends. Cough is usual, of varying type. Pressure on the trachea causes a harsh, strident cough—frequent in aneurism of the

transverse arch. One variety is termed the "goose cough." Paralysis of a vocal cord causes a toneless, muffled cough. The sputa consist of mucus, serum, pus; if gangrene occurs it is offensive. Blood may come from tracheal granulations, congested bronchi, necrotic pulmonary tissue, or from the sac "weeping."

Dysphagia occurs with aneurisms of the transverse and descending aorta, whenever the esophagus is compressed. Food seems to lodge at the obstructed point, and if low down may be regurgitated. If portal stasis occurs there will be digestive troubles.

Pressure on the venæ cavæ is less frequent but may be so great as to cause the opening of collateral channels for circulation. The cutaneous veins dilate and general or local edema appears. The pulses become unequal, that compressed being delayed. The heart may be pushed to one side.

**Aneurism of the Ascending Aorta:**—If this is close to the aortic ring in the sinus of Valsalva, it is apt to elude discovery until it breaks into the pericardium, causing sudden death. Arising from the convexity it may become very large; if it grows forward a pulsating tumor appears to the right of the sternum, in the second and third intercostal spaces. The bone is eroded and in time the sac penetrates beneath the skin. The pleura may be penetrated and the lung compressed or collapsed.

Arising from the convexity, the superior vena cava is compressed, and the aneurism may open into this vessel. Pressure on the right subclavian vein causes congestion and edema of the parts drained by it. Pressure on the right recurrent laryngeal nerve irritates and then paralyzes the right vocal cord; the heart is pushed down and to the left, and dilatation of the aortic ring causes relative incompetency of that valve. This induces left ventricle hypertrophy.

Aneurisms from the concavity sometimes appear at the left of the sternum, displacing the heart down and to the left.

**Aneurisms of the Transverse Arch:**—These generally develop backward, pressing on the trachia and esophagus, causing dyspnea and dysphagia. Paroxysmal cough and stridor are very common. If the sac projects forward the tumor appears at the right of the upper sternum, which is eroded. These aneurisms may become enormous, invading both pleura. They compress the left recurrent laryngeal nerve and bronchus, first irritating the nerve and then paralyzing it. Distressing spasm of the larynx is thus caused; swallowing becomes difficult also, from spasm of the muscles of deglutition. Angina pectoris may occur from pressure on the cardiac branches of the recurrent; or the voice is affected. Pressure on the left bronchus causes retraction of the lungs,



the side becoming immobile, with tympany and weak breathing sound. The side shrinks as the lung retracts; and, collapsing, percussion shows dullness and absence of respiration; secretions may be retained, causing various rales, or bronchorrhea or bronchiectasis develop.

The thoracic duct may be compressed. If the innominate or carotid artery is compressed the pulses become unequal, that on the compressed side lagging behind the other. Pressure on the sympathetic nerve causes a dilated pupil at first, a contracted one later. Tracheal tugging may be developed. The aneurism may rupture into the trachea.

**Aneurism of the Descending Arch:**—The growth is generally backward or to the side of the thorax; but occasionally it appears at the left of the sternum. The symptoms caused in the left lung are similar to those described in the preceding paragraph; dysphagia occurs, and erosion of the third to the sixth dorsal vertebræ results. When the spinal cord is compressed, paraplegia appears.

**Aneurisms of the Descending Thoracic Aorta:**—These usually develop near the diaphragm, and are obscure. Dull pain may be felt in this region, with impaired resonance and feeble respiration in the area occupied by the tumor. Dysphagia and regurgitation are common, but respiration is little affected. Other pressure symptoms do not arise, excepting from some pressure upon the lung as the tumor enlarges. Other portions of the aorta may become involved in the disease.

**Physical Signs:**—The patient may appear healthy but develops a cachexia in time; the tumor, pulsating or quiet, may be detected at some point of the surface, to the right or the left of the upper sternum, or above it; or between the scapulæ below the fourth dorsal vertebra. The skin may be smooth and shining, and the prominence may become quite large. It is apt to end abruptly, something like a watch-glass set upon the skin, the covering of the prominence being red, or cyanotic, or shining, the skin above it being fused with any other covering the aneurism may have. The capillaries may be enlarged, or the veins distended or tortuous; edema and congestion of one or both arms may appear, including the corresponding half of the neck. Pulsation may occur in abnormal situations, the diastole being marked by a collapsing flap; the heart is displaced, generally downward and to the left, but sometimes forward. The motion of respiration may be lessened or absent on half the thorax, usually the left, and the side may be evidently retracted; one pupil may be immobile, dilated or contracted; sweating of the head is common, sometimes unilateral.

Bimanual palpation is a useful means of judging the pulsation; this may not be visible even in a large projecting mass if it is well filled with

fibrinous deposits; if empty the pulsation is a slow heave, expansile and followed by collapse of the thin wall. A diastolic shock may be felt from the recoil of the elastic wall of the sac, and quite rarely a thrill may be detected. The pulse at the two wrists may be unequal and one lagging slightly behind the other. The liver may be congested.

The tracheal tug is a distinct downward pull of the trachea, caused by the stroke of the aneurism against the bifurcating trachea or a bronchus. It may be demonstrated with a wide aortic leakage but is most marked in aneurism of the transverse arch. Have the patient raise his chin, strongly extending the neck; insert the tips of the forefingers below the cricoid cartilage, and pull the larynx gently upward; the trachea will be felt to be jerked distinctly downward with each stroke of the ventricle.

Percussion is an important means of demonstrating abnormal areas of dullness. The most important point is the right infraclavicular region, close to the sternum; it may also detect displacement of the heart.

If the sac is filled with coagula auscultation will not develop a bruit; otherwise an abnormal murmur may be audible over the sac. Either of the normal heart-sounds may be intensified, diminished or impure. Babcock speaks of a loud peculiarly ringing second tone heard over the tumor or but one cervical artery. A distinct bruit may accompany the second sound, or there may be a double to-and-fro murmur widely diffused. Occurring close to the heart, abnormal murmurs are less significant than when heard at a distance. The normal heart-sounds may be transmitted much farther than usual. Bruits may arise in the sac itself, but are probably transmitted from the heart and modified by the conditions obtaining in the sac. Sometimes the bruit can be detected when the patient holds the bulb of the stethoscope between his teeth, his lips being closed around it. Abbott of St. Paul has described a case in which this was the only evidence of aneurism discoverable.

**Diagnosis:**—This is easy enough when an external tumor shows the expansile collapsing pulsation; while still small it may be impossible to make a positive diagnosis. The history, occupation, age and sex; with symptoms showing pressure within the thorax, such as the pain as described, dyspnea influenced by posture, clanging cough also influenced by posture, and difficulty of swallowing, are the principal features. We may also find bulging in an aneurismal area; dullness, a displaced heart, and the altered signs of auscultation, especially a harsh aortic systolic bruit with a clanging second sound, which may be split or doubled and is most plain over an abnormal dull area or in one cervical artery with a diastolic shock. The aneurismal pulsation may equal in intensity the apex beat. Tracheal tugging is strong evidence.



Thoracic cancer is sometimes indistinguishable from aneurism; in the former the growth is generally more rapid, the decline in strength and weight also. The pulsation differs, as well as the bruits; pulsation is not expansile in a solid tumor, being due to the impulse from an artery or the heart underneath it; but the same is true of an aneurism filled up with coagula. The tracheal tug is not present; the growth does not appear in the usual seats of aneurism. It never changes its direction with sudden alteration in the symptoms, nor does it cause a symmetry of the pulses; though it is conceivable that in some cases it might do so. Malignant tumors here are generally secondary, or present implication of glands in the axilla or neck.

Abscess in the mediastinum develops suddenly, with considerable pain before pressure is manifested. Fever occurs early, and there are no special murmurs.

Pulsating empyemas are exceedingly rare and may occur in children. The history and physical examination usually explain the case. In doubtful cases the x-ray offers a reliable means of decision.

The prognosis is very bad. Spontaneous cure is very rare, and here the surgeon fails to make good. The progress of the disease is irregular and may be varied by remissions. When the sac develops externally, the course may be rapid; ten years is a long limit, but has been largely surpassed. Death may be due to rupture of the sac, but is more frequently due to pressure.

**Treatment:**—The natural or spontaneous cure occasionally occurs in small sacculated aneurisms with a narrow opening into the aorta. Such a sac may fill up with fibrin, which becomes organized. We seek to imitate and favor this method by placing the patient in the best conditions for its occurrence. For this purpose the first indication is rest; the patient is confined to his bed, absolutely, nutrition being sustained by massage. Vascular tension is reduced to the lowest possible point. This is accomplished; first, by reducing the bulk of the blood, through the medium of the dry diet and other measures fully described in the treatment of cardiac insufficiency. We also invoke here the potent influence of veratrine, the safest and most effective agent as yet developed for sustained lowering of vascular tension during prolonged periods. The diet should consist of light, easily digested but nutritious food; it is not necessary to confine the patient to bread, butter and milk; on the contrary, meat powders may be used, with abundance of gelatin, to favor coagulability. The effects of iodide of potassium have never been satisfactorily explained. It does not act as an antisyphilitic, or altogether by relaxing vascular pressure, but its use has been confirmed by clinical

experience in many instances. A typical case occurred in the writer's practice. The aneurism was in evidence, a pulsating tumor appeared in the second and third intercostal spaces, to the right of the sternum; the pulsation collapsing quickly, the area dull on percussion. the pressure effects unmistakable. Dyspnea was great; the patient was unable to leave his bed. He was placed upon the dry diet, with potassium iodide up to 120 grains a day. During the three months he remained under the writer's treatment he improved so greatly that physicians then examining the case for the first time were unable to make the diagnosis of aneurism, although all those who saw the case when it came under treatment considered the diagnosis beyond question. During this period the regime was so far relaxed that by the end the patient walked a mile in a day without discomfort. The termination of the case, unfortunately, is unknown; but there seemed no reason why the improvement thus happily inaugurated should not continue under the same circumstances.

The above measures usually result in speedy relief from the suffering, without the employment of anodynes. Imminent danger, from vascular tension too high for safety, may require venesection. When the tumor has appeared at the surface ice may be applied with advantage, while the patient is lying down. If he goes about, some mechanical means may be contrived for the protection of the outgrowth against injury. The bowels must be kept regular and straining at stool must be absolutely prevented. In the last days morphine and chloroform should not be withheld.





## PART VI

# DISEASES OF THE DIGESTIVE SYSTEM

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## I. DISEASES OF THE MOUTH

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### STOMATITIS

The disease is a superficial, catarrhal inflammation, usually caused by mechanical irritants, hot, cold or sharp foods, chewing toothpicks, tobacco, carious teeth, mercury, and especially the use of the toothbrush, and the habit of leaving false teeth in the mouth for long periods. Typhoid and the eruptive fevers, digestive maladies and morbid processes extending from the nasopharynx are causative.

The inflammation commences with burning or itching at one point, with swelling and dryness, the membrane being puffy and tender. The parts affected may be marked by pressure of the teeth. The tongue papillae enlarge and little vesicles form on the mucosa, which break leaving erosions that may deepen into ulcers. The taste is perverted, sapid foods cause pain, and cold fluids are craved. The saliva is acid until ulcers form, and contains disintegrating epithelium, leucocytes and a few red cells. Various microorganisms are also present. General symptoms are those of any accompanying malady. The course occupies a week. The diagnosis is made by inspection. Clear the bowels and regulate the digestion and diet. Stop all irritations, and substitute rubbing with a pad of absorbent cotton for the germ-laden, lesion-producing toothbrush. Instruct the patient to place false teeth in a cup of water over night, with some volatile aromatic antiseptic such as a menthol tablet. Employ any mild non-toxic antiseptic lotion as frequently as possible in the mouth, or sucking a grain tablet of any sulphocarbolate salt will answer. Dry any ulcers present and dust with iodoform—yes, its odor is bad, but nothing else so certainly, promptly and permanently stops the pain. Tender and ulcerated spots from the pressure of tooth plates should be penciled



with tincture of benzoin daily. The gums and mucosa are firmed by using a 1-6 grain granule of berberine as a lozenge seven times a day. Cut out the potassium chlorate—it has caused fatal suppression of urine. Small and frequent doses of iron phosphate and quassin aid convalescence especially if the patient will use them as lozenges to secure the local as well as the general effect.

### APHTHAE

Aphthous stomatitis occurs most frequently between the ages of two and six years, occasionally in adults. Bad hygienic influences, malnutrition, dentition, gastric affections, debility from any cause, and eruptive fevers are causes. Local irritation, chemic or bacterial, excites attacks.

Vesicles appear on the edges of the tongue, inside the lips or cheeks, from a pinhead to a pea in size, soon breaking and leaving ulcers, round or oval, surrounded by inflamed zones. The tenderness prevents rest or feeding, salivation attends, the breath is bad, and there is some fever. The digestion is always disordered and the bowels are constipated or diarrheic. The ulcers may become confluent, especially in infective fevers. In Bednar's aphthae large white patches are seen on both sides of the hard palate near the teeth and may involve the bone. Riga's disease is a form found in southern Italy, a raised gray swelling on the frenum and under surface of the tongue, appearing after the eruption of the lower incisors. The duration of an attack is within a week unless prolonged by successive crops. The diagnosis is from thrush.

Confluent forms are more troublesome. Bednar's form is usually fatal.

Remove all irritations, make the food absolutely bland and tasteless, empty the bowels and keep them disinfected, and require absolute asepsis in all utensils employed in feeding the child. The treatment of stomatitis is applicable here. As the malady is one of debility local vital incitation is indicated, and the ulcers should be painted with nuclein solution several times daily. A grain tablet of calcium sulphocarbolate may be used as a lozenge every half hour by children old enough to be controlled. Others should have zinc sulphocarbolate solution applied as a lotion as many times a day as possible. Five grains in an ounce of cinnamon water is an average strength to employ. Confluent or spreading ulcers may be touched with spirit of turpentine daily, as at once antiseptic and stimulant. Beware of applying vitality destroyers to dying tissues. The diet should be nutritious and easily digested, and vital incitation by the tonic arsenates and nuclein kept up from the first. Pure open air and sunlight are powerful aids.

## MEMBRANOUS STOMATITIS

The intenser inflammations of the mucosa may produce false membrane, croupous, diphtheritic, gonorrheal or syphilitic. Forms secondary to ordinary diphtheria are treated in connection with that malady. Strepto- or staphylococcus infection may be present. Venereal infections are seen in newborn infants. The symptoms are those of stomatitis, with the presence of pseudomembrane, which if removed reveals deeper ulceration than occurs in the preceding forms. The supportive treatment advised is still more imperatively indicated here. Lozenges are far more effective than lotions, as their period of action may be made almost continuous in children old enough to comprehend the need. In younger ones the physician may succeed in rendering his antiseptics pleasant enough to be thus used.

## ULCERATIVE STOMATITIS

Children from 3 to 8 are most affected; in damp weather, unhygienic surroundings, illy nourished, with poor vital resistance, and the dirt and squalor of city slums. Cachectic states, and local irritations such as are supplied by the teeth, favor the attack. Almshouses, jails and barracks are sometimes the scene of epidemics. Mercurialism, scurvy and other toxic states favor its occurrence. The specific cause is one or many microorganisms, taking on malignancy under such conditions. It is contagious and may be conveyed in milk. Ulceration commences at the edges of the lower incisor gums, spreading to the cheeks and lips, the mucosa deep red, spongy and bleeding, sloughing deeply, teeth loosening and even the bone being attacked and necrotic, salivation free and discharges fetid, mastication and sometimes deglutition impossible. The tongue swells, also the submaxillary glands. Discharges swallowed cause nausea and vomiting, and even diarrhea. The cachexia and debility are increased rapidly. More or less fever is present. The course is acute, ending within a week unless protracted by necrosis, etc. A neurotic form occurs in elderly women and lasts indefinitely. The diagnosis is made by the local conditions, fetor of discharges and cachexia. The prognosis depends largely on the treatment. Patients should be promptly isolated, and the hygienic influences made the best possible. Feed up to the limit of nutrition and digestion, foods readily taken and assimilated, raw meats, turtle soup, clam broth, junket, fresh fruit juices, raw eggs, *café au lait*, given every two hours in full doses with artificial digestants. Potassium permanganate solutions as strong as can be borne are useful, and the em-



ployment of antiseptics should be as powerful and continuous as the case admits. Here again the application of stimulant-antiseptic volatile oils and nuclein locally is urgently required. Pads of linen containing charcoal may be placed in the mouth to absorb the odorous discharges, but if possible use antiseptics whenever the fetor returns.

We prefer the aromatic disinfectants to peroxide and the destructives of all sorts. Pencil the ulcers with turpentine, or cinnamon oil, once a day and apply iodoform when needed to alleviate suffering. Apply nuclein to all ulcers and dying tissues three times a day, or when possible continuously. The writer has witnessed such good effects from it when applied to tissues on the verge of dying and rescued by the local reinforcement of vitality that he urges this remedy on his readers. Chlorine water is a most useful local disinfectant and stimulant also and may be applied as a lotion to the whole mouth every one to three hours. Do not extract loose teeth; they may be preserved. Necrosed bone should be removed. As soon as the acuter symptoms subside begin the use of berberine granules as lozenges for their local effect in contracting the relaxed tissues. These may be used almost continuously with advantage. Potassium chlorate has a great repute in this and other buccal maladies but we look upon it as a doubtful and dangerous drug, and only advise it as a means of preparing chlorine solution, as described in the chapter on diphtheria.

## THRUSH

A disease of infancy, with digestive disorder, bad hygiene and bad constitution, inherited cachexia or following the eruptives. The specific germ cause is the *saccharomyces albicans* with which other organisms may be associated. From its rounded spores develop long mycelial threads with torula cells budding from the ends. The threads penetrate the deep mucous layers and enter the mucous glands. The growth requires an acid medium and unhealthy membranes, such a condition as is furnished by these patients with badly cared-for milk leaving its souring remnants in the mouth. The local destructive effects of sugar and its fermentability make it a potent auxiliary. The mucous membrane is livid and inflamed, and on the surface appear the raised patches of thrush, first on the tongue or the inside of the cheeks, spreading at the edges till they coalesce and may cover large sections of the mucous tract, extending to the pharynx and even to the larynx and stomach. They look like bits of curdled milk, but are found to be adherent. They may become loose or penetrate the membrane deeply. The saliva is acid.

There is always digestive trouble, dyspepsia and diarrhea, and evidences of the causal malady.

The diagnosis is made by the microscope, though aphthae may be distinguished by the presence of salivation, adherent deposits, ulcers, small and separate patches, herpetic vesicles at the start, tenderness of ulcers, as well as absence of the mycelial growth. The prognosis of thrush is good, but its advent in the course of cachexias is ominous.

The disease is preventable by keeping the mouth and the milk, bottles, tubes, etc., in proper cleanliness. Alkaline washes are useful, of lime or soda water; sugars and starches forbidden, and lime water added to the milk. Any mild acid antiseptic is curative, a weak solution of hydrochloric or lactic acid being suitable. Sweeten with saccharin or glycerin. Chlorine water suits bad forms. The esophagus may be so obstructed as to necessitate forcible catheterization of this tube to introduce nutriment. The tonic-dietary regime is indicated, with correct hygiene and the treatment of accompanying maladies.

### NOMA: GANGRENE OF THE MOUTH

Gangrene beginning on the inside of the cheeks may spread to the jaw and lip. The vessels are occluded by thrombi, the connected glands are soft and swollen, and pulmonary infarctions may occur. Metastatic myocardial infiltration, membranous colitis and pericardial suppuration have been described. Gangrene of the gums sometimes occurs in newborn babes.

The malady is more common in girls, from 2 to 5. It occurs in low wet lands, in the slums, usually secondary to scarlatina, smallpox, typhoid fever, whooping-cough, and especially measles. Diphtheria and other microbes have been found.

On the inside of the cheek appears a dark, ragged, sloughing ulcer, appearing and spreading painlessly. This may be preceded by an induration with violaceous tint of the cheek. Over this a small blister or vesicle forms, which covers the black eschar of gangrene. An offensive ichorous discharge follows with shreds of the breaking down tissues. The fetor is extreme. The malady may involve half the face and extend to the bones, but rarely crosses the median line. Profound prostration supervenes. The temperature may rise to 104° F., with delirium and dropsy, preceded by dyspeptic disturbances. Sometimes there is diarrhea but in other cases the digestive functions are remarkably little affected, the child taking food well when the gangrene is active. Gangrenous disease of the pulmonary tract may follow contamination, or colitis, or



genital gangrene. If recovery occurs the gangrenous tissues separate, granulation commences, and cicatrization follows, with deformity.

Diagnosis is unmistakable. Anthrax occurs in adults, beginning on the skin, and the anthrax bacillus is present. Ulcerative maladies of the mouth are not gangrenous. Recovery is rare.

The case should be isolated strictly. Success in treatment lies in the earliest recognition of the disease and its prompt and effective management. Cauterize with the best agent accessible, the actual or Paquelin cautery being preferable. Remove loose and dead tissue and thoroughly cauterize the base of the excavation, then dress with spirit of turpentine or other volatile oil. The mouth washes should likewise be aromatic antiseptic. Nuclein should be applied continuously and given internally in maximum doses, as well as the tonic arsenates of iron, quinine and strychnine. The older practitioners believed that full doses of the tincture of the chloride of iron—a dram every four hours for an adult—possessed superior powers as an inciter of vitality—and this has not been disproved. The advice as to diet given in the preceding section may be repeated here. Antitoxin will of course be employed in diphtheritic cases, and in streptococcic forms Marmorek's serum may prove effective; but dependence should not be placed on such remedies to the neglect of others.

### MERCURIAL PTYALISM

Certain persons are unusually susceptible to toxic effects from mercury. Those who work with this metal are also liable (See Mercurial Poisoning, Part X). The first evidence of its toxic action is usually a metallic taste, then one or more teeth seem too long and to project from their sockets, while the gums become soft and tender. Salivation follows, the breath is fetid, tongue and buccal mucosa swollen, and mastication painful. The malady may go on to ulceration and even extend to the teeth and bones of the jaw, which may necrose. There is some fever, more or less liquefaction and absorption of tissues, diseased and normal, as described in Section X.

The diagnosis rests on recognition of the cause, which may be detected by inquiry as to occupation. The prognosis is good.

Stop the mercury. Stop salivation by the use of atropine enough to dry the mouth. This is also preventive when it is desirable to push mercury to the limit. Treat the stomatitis as advised in preceding sections. Mercury may be eliminated by the use of iodine preparations, none as good as calx iodata, ten grains a day, as the lime is needed as a reconstructive. The first effect may be a return of ptyalism, as the iodine

renders the mercury soluble. Prof. George F. Butler advises for the local and general relaxation the use of tincture of iron, gtt. 10, and potassium chlorate, gr. 1, in a dram of water and glycerin, to be allowed to lave the buccal mucosa and then to be swallowed, this repeated every two hours. The value of berberine used locally as previously advised is never better shown than in this form of stomatitis. Baths are useful, with rubbing. Calcium lactophosphate may be given for months, gr. 10 daily, to restore strength to the cell walls.

## II. DISEASES OF THE TONGUE

### ACUTE GLOSSITIS

The predisposing causes are obscure—poor health and cachexias predispose to everything morbid. Excitants are stings and bites of insects, and corrosives or burns. Slight abrasions open the way for microbic invasions. The toothbrush is probably a frequent source of such injuries.

The onset is sudden and the progress rapid, the tongue swelling until it protrudes from the mouth, sore and aching, coated, dry and cracked. Stomatitis and salivation usually attend; talking, swallowing and even breathing may be difficult, and suffocation may threaten. The cervical and sublingual glands swell. Suppuration may follow, the symptoms being obscure until the pus makes its way to the surface. The inflammation reaches its acme in about three days and subsides in a week. The prognosis is good.

Small pellets of ice allowed to melt in the mouth are grateful. Any aromatic water makes a useful mouth wash, mint water being especially pleasant to the patient. Use a weak alkaline solution, as one of borax or sodium bicarbonate. If edema is great superficial scarification may be of value. Keep the bowels empty with salines and aseptic with sulphocarbolate of zinc. Ice bags or cold compresses to the neck are of value. Suppuration may be prevented and resolution hastened by quickly saturating the patient with calx sulphurata, half a grain every half hour; dropping five drops of nuclein solution on the tongue every hour also. Deplete the blood and reduce tension by enemata of saturated salt solution, half a pint every four hours, quite cold. The rectum may be utilized for feeding, but abstinence is useful here and rarely objectionable. Tracheotomy may be requisite to prevent choking. Steaming has been advised and probably is of some small value.



## CHRONIC GLOSSITIS

The causes are, acute attacks, the use of tobacco by chewing or smoking, strong liquors, and irritating foods. The irritation of jagged teeth and the discharge from caries are frequent causes.

The tongue is smooth and red, generally or in patches, furrowed, and the general health impaired. The cause is to be found and removed; the diet and bowels regulated, teeth put in order. An effective local application is corrosive sublimate a grain to the ounce of distilled water, painted over the affected patch twice a week. In the intervals apply nuclein solution twice a day. Mild antiseptics are useful, such as a two-grain calcium sulphocarbonate tablet sucked like a lozenge every four hours.

## GLOSSITIS DESICCANS

Rare, chronic, cause unknown. The tongue is divided into areas by deep furrows, in which food lodges and causes irritation and ulceration. Let these be cleaned carefully, thoroughly and without undue rudeness after each meal; then pencil the furrows with tincture of benzoin and use berberine granules as lozenges. The malady is not easily cured but the foregoing has succeeded.

## TYLOSIS LINGUAE

The glossal epithelium projects in irregular areas of hyperplasia, maplike, of unknown cause and persistent. It does no harm except by frightening the possessor with the idea of serious disease.

## LEUCOPLAKIA ORIS

White or bluish, scarlike patches appear on the buccal mucosa, the sides of the tongue, coming and going, the cause unknown. Syphilis and the pipe have been suspected. There are no symptoms unless ulceration occurs. In children patches appear resembling ringworm. Paint with tincture of benzoin three times a week, and on alternate days with tincture of iodine if not sore. See to the teeth.

## ANGINA LUDOVICI

The malady is most often seen with or after scarlatina or diphtheria, and is probably a streptococcal infection. It may come from injury.

An abscess forms under the tongue, the whole floor of the mouth and the neighboring parts of the neck swelling rapidly. Pain and other inflammatory evidences are marked, mastication, talking and swallowing are impaired, and alarming dyspnea may result. Fever is marked and debility may be rapidly induced, of the typhoid or the septic type. Resolution is unusual and the pus may burrow if not promptly evacuated. It is a dangerous malady. It should not be mistaken for an aneurism, or vice versa.

Drain the bowels quickly and saturate with calx sulphurata, applying nuclein to the tongue, five drops every hour. Tracheotomy may be required. Open quickly when pus is found to have formed. Support by rectal feeding, and sustain by full doses of strychnine hypodermically.

### III. DISEASES OF THE SALIVARY GLANDS.

#### SALIVATION: HYPERSECRETION

This rarely occurs apart from the maladies described above. It has occurred from emotional causes. The writer reported a case that had lasted five years, following the insertion of an amalgam filling in a tooth, the patient having already some gold fillings. The amalgam was removed and the salivation ceased at once. Presumably the metals had set up a galvanic current which was the excitant. There may have been an unusual condition of the saliva, since such multiple fillings are usual and do not as a rule cause salivation. In cases due to transitory causes the remedy is atropine.

Xerostoma, dry mouth, is due to neural influences, emotional, or to mouth breathing. It may occur in diabetes. The membrane may be red and glazed, cracked, the teeth crumbly. The remedies are muscarine or pilocarpine which excite salivary flow, with irritant masticatories such as bits of aromatic root like calamus. In cases of centric origin give zinc phosphide, gr. 1-6 four times a day for a week. In the mouths of glassblowers may be found opaline plaques, dilatations of the cheeks and of Steno's duct, or contractions of the cheek muscles, with impaired hearing. The parotids may be emphysematous and crepitant.

In septic maladies the parotid gland occasionally is infected and suppurates. It is an unfavorable omen. The diagnosis may be made by the swelling of the gland, and fluctuation. It should be promptly and freely opened and drained, after disinfection. Strong supportive measures are indicated.



Chronic, symmetric enlargement of these and the lachrymal and other salivary glands has been recorded. This may be secondary to mumps, pharyngeal or renal disease, or to lead or mercury poisoning.

## IV. DISEASES OF THE TONSILS

### ACUTE TONSILLITIS

Inflammation may affect the mucous surface, dip into the follicles or extend to the parenchyma. The surface may be red and swollen, covered with soft exudate, which fills also the follicles, or the stroma infiltrated and suppurating. The exudate consists of epithelium, pus cells and debris, with cholesterin, various microorganisms in older specimens, becoming cheesy when retained and sometimes chalky. The pus may burrow deeply behind the gland. Herpetic vesicles sometimes appear, break and leave thin adherent membrane. The mucosa may slough, separating by ulceration.

Tonsillitis occurs most frequently in early youth, in boys, in the spring and in strumous or rheumatic persons. In fact, we now look upon tonsillar inflammation as the initial microbic invasion that later develops acute rheumatism. Each attack predisposes to subsequent ones. Excitants are, exposure resulting in taking cold, inhalation of irritant gases or foul air, septic influences, mechanical or chemical irritants, and especially the settling of a swarm of microorganisms on the tonsils and germination in the crypts.

**Acute Catarrh:**—This accompanies catarrhs of the soft palate and pharynx. It begins with an itching spot, which is reddened and swollen, spreading at the edges, causing difficulty in swallowing, pain radiating to the ear and angle of the jaw. Cough, salivation and fetid breath are less common than when the deeper structures are implicated. A loose soft exudate may cover the surface. Some fever attends. The attack is sudden, lasts a few days and rapidly subsides. The middle ear may be affected.

**Acute Follicular Tonsillitis:**—In addition to the symptoms displayed by catarrh the disease penetrates to the crypts, from which plugs of thick exudate project, sometimes forming little pus collections or ulcers. Both sides are affected. The tonsil and lymphatic glands are swollen and the swelling may be felt and seen on the surface of the neck. The attack may begin with a chill and the fever is high for the extent of tissue involved. Aching of the head, back and limbs attends, with anorexia, heavy urine and depression. The attack usually subsides within a week.

Abscesses may form and burrow, sequences may be pericarditis, endocarditis, pleurisy, nephritis, erythema nodosum or other cutaneous disorders. The exudate may form foul smelling plugs that may be pressed out.

**Quinsy:**—Parenchymatous tonsillitis occurs mostly in young adults. The throat is dry, swallowing difficult, pain in the ears severe, voice husky, and hawking brings up a little adhesive mucus. If pressure is exerted on the larynx dyspnea may be marked. The tonsils are swollen and may meet in the median line. They are red, firm, often covered with thick exudate. The submaxillary glands are swollen and tender. It is often impossible to separate the jaws enough to introduce food. Within three days pus forms and great relief follows its discharge. Resolution occurs, rarely spontaneously, with greater frequency as treatment is instituted early and effectively. The fever is often quite high, the pulse correspondingly fast, the headache severe, sometimes delirium and considerable prostration. Resolution sets in after three days in children, later in adults. Ten days covers the usual attack. Pus may burrow deeply and appear at the clavicle. Paralysis of the soft palate and pharynx may remain. Chronic enlargement frequently results from repeated attacks.

In the necrotic form the constitutional symptoms are marked, the cervical glands less enlarged. It is difficult to distinguish from diphtheria, which is in fact sometimes present.

The diagnosis from diphtheria is not always possible, but tonsillitis presents a soft, yellowish deposit beginning at the mouths of follicles, easily removed, leaving an intact surface, never extending beyond the tonsil, not quickly if at all reforming after removal, with high fever for a day or two only, falling permanently, rarely albuminuria, the lymphatics little if at all swollen, and strepto- or staphylococci but no diphtheritic bacilli. Scarletina is excluded by the history of the attack and non-prevalence. Prognosis is good. Necrotic cases are graver.

The predisposition to quinsy may be lessened by cold applications to the neck, salt rubbing, general cold baths, regulating the digestive conditions and excluding autotoxemias, but particularly by keeping at hand a germicidal preparation for instant application whenever any tonsillar irritation shows that a brood of microbes has begun operations there. The chlorine mixture described in the chapter on diphtheria answers this purpose admirably—a teaspoonful taken undiluted, repeated every two hours as needed, promptly quells the commotion in its incipency, and as the attacks are prevented the predisposition to them subsides.



Clear the bowels at once and decidedly, by calomel followed by salines, and without waiting for this begin giving calx sulphurata, gr. 1-6 every quarter-hour till saturation, and sustain this till the attack is jugulated. This will be materially aided by the use of the chlorine as above. The same good result has been attained by administering nuclein solution, five drops on the tongue every hour. Other useful but less efficacious remedies are guaiac lozenges, constantly sucked; sodium salicylate, gr. 5 every two hours, nitrate of potassium in the form of 'quinsy balls', and a 10 to 20-grain dose of quinine. A full hypodermic dose of pilocarpine, gr.  $\frac{1}{4}$ , has also succeeded. Relief may be had from small pellets of ice sucked, or ice cream; or cold to the outside of the neck.

The suffering may require hypodermics of morphine and atropine, which are not very effective, as is usual when there is imprisoned pus. Fever demands aconitine enough to hold the circulation near normal equilibrium, and this is thought to exert specific powers here. Bosworth's advocacy of tincture of the choride of iron as a specific when given early is simply so much more testimony to the efficacy of chlorine. Cocaine solutions locally give some little momentary relief; scarifications much more. The early evacuation of pus is at once followed by subsidence of pain and fever. Guard all but the end of the bistoury by wrapping with adhesive, and cut out toward the center of the throat. Dyspnea may be so extreme as to necessitate tracheotomy.

### CHRONIC TONSILLITIS

Repeated attacks of acute inflammation result in hyperplasia of the glandular and connective elements, the latter gradually destroying the former and contracting the gland—resulting in Pyncheon's small, submerged tonsil. Caseous masses may occupy the follicles. Nasopharyngeal catarrh, adenoids and implication of the eustachian tube and impairment of hearing may attend. Predisposing causes are the scrofulous or syphilitic diathesis, boys between 5 and 15 being most frequent victims, living in bad hygienic influences. Excitants are those of the acute form, and infectious maladies. The symptoms may be a liability to acute attacks, hawking of mucus, obstructed nasal passages leading to mouth breathing, sleep being disturbed by dyspnea, or nightmare from imperfect oxygenation. Swallowing may be difficult, in the subacute exacerbations. Wheezing and croupy cough are common. Asthma may occur. Tinnitus is frequent. Taste and smell are impaired. Plugs in the crypts render the breath offensive. The expression is

stupid, thought and speech slow. Stammering is not rare. Mental development may be retarded and the child does not keep up with his comrades in school. Chicken-breast sometimes develops, the ribs separate widely in front and approximate posteriorly. The upper chest narrow, the shoulders prominent. The first heart sound is weak. The lower lateral thorax is retracted in inspiration. Puberty may be retarded, anemia is marked, headache follows attempts at forced study, palpitation, habit-chorea, enuresis, are associated with capriciousness and a sullen disposition. Aproxia, inability to concentrate the mind on any subject, is marked. The diagnosis is made by inspection. Adenoids may be detected by passing the finger into the pharyngeal vault. Nasal obstruction is to be excluded if it does not coexist. Thumb-sucking deforms the jaw, the central incisors protruding. In retropharyngeal abscess the swelling is acuter and in the median line, pushing the palate forward.

The tonsils should be removed in whole, not sliced down. As ordinarily employed the tonsillitome simply removes the superficial layers of the gland, while the diseased portion of the tonsil is hardly touched. Pyncheon, who is probably the foremost living authority on the subject, prefers the galvanocautery. Sometimes we find patients who absolutely refuse any operative procedure, and very rarely will carry out more tedious methods. A girl 8 years of age vehemently objected to being cut or burned. Her nurse, a very intelligent and capable French girl, offered to carry out our plan and the child agreed to it. The nurse applied pure water free glycerin to the tonsils at least twenty times each day, securing each time a slight abstraction of water therefrom, the effect being made sufficient for therapeutic purposes by the numerous repetitions. Within a month the tonsils were reduced to their normal size. If any man ever cured such cases by the application of absorbents locally or internally, he has had better success than the writer, with the above exception. And yet it is a question whether the wholesale extirpation of this organ, which presumably has some purpose in the human economy, is entirely justified. Is it not possible that early in the disease, before marked degenerative changes have taken place, much might be done by cleaning out the crypts and applying antiseptics and tissue stimulants, with the internal administration of alteratives and cellular stimulants, such as calcium sulphide, calcidin and nuclein?

Internal treatment consists in meeting such indications as each case may present. Acute exacerbations are to be treated by suitable local and general expedients similar to those described in the article upon Acute Tonsillitis.



## V. DISEASES OF THE PHARYNX

### ACUTE PHARYNGITIS

The predisposing causes of catarrh of the pharynx are, the scrofulous or other diathesis, autotoxemia or uricacidemia, and the habit established by repeated previous attacks, excitements, irritating food or drinks, exposure to cold and wet, and the presence of any stray swarm of microorganisms that may settle on this spot. Catarrh may extend from the nose. In influenza and other infections it is epidemic. Many microorganisms have been found here.

The first symptom is itching, followed by burning and dryness, stiffness and dysphagia as swelling appears; dry cough with hawking, often the ear or larynx participating. The membrane is red, lilac or purple. Spots or patches of exudate or secretion may appear. Herpetic vesicles may be present. The onset is rarely heralded by chilliness, headache, fever, rapid pulse, dry skin and anorexia. Within a week the attack runs its course and subsides, leaving some infiltration and soreness.

The diagnosis is made by inspection.

This malady offers a ready opportunity for demonstrating the truth of the proposition that in the beginning of an acute hyperemia the attack may be aborted by a powerful contractor of the vessels. Many times we have quelled the incipient riot by a few doses of the chlorine mixture described in the chapter on diphtheria, or by painting the focus of beginning inflammation with tincture of iodine or of benzoin, or glycerin of tannic acid, or chromic acid solution; in fact any efficient astringent. Recognizing the fact that such attacks often indicate toxemia and this the weakest point at which the general poisoning may be manifested, a brisk cathartic and abstinence from rich food for a day are indicated. Every time such an attack is permitted to run its course the predisposition to subsequent ones increases, and every time it is jugulated this predisposition is weakened. The domestic remedy of gargling with capsicum acts by stimulating the local tissues which by increased vitality are aroused to throw off the disease. Sanguinarine acts in this way—gr. 1-67 every quarter hour till faint nausea indicates the beginning of toxic action. Many other local remedies have been used with success, the principle action being as above stated. Inhalations of steam relieve established inflammation, as do sprays of camphor-menthol, or lozenges of gualiac. The capillary engorgement is also to be quelled by the internal use of aconitine or veratrine. A hot mustard footbath on going to bed is a useful derivative.

Membranous pharyngitis occurs in debilitated, cachectic persons on exposure to cold or impure air, and during epidemics of infectious fevers. The symptoms are those of a severe catarrh, with a thin, yellowish false membrane appearing in patches, with vesicles, easily detached and leaving erosions but not ulcers. The treatment above detailed amply suffices.

### CHRONIC PHARYNGITIS

We see nasopharyngeal catarrh, a dry form, and a follicular variety. The membrane may be red, thick and viscid, or pale, thin and dry. The glands may project as red nodules, the lymph cells hyperplastic and secretions retained. These maladies are common in men of sedentary habits, hard brain workers, public speakers who frequent rooms laden with foul air and tobacco smoke or chemical vapors, or who strain the voice. Digestive difficulties, autotoxemia and nasal maladies aid the causation.

The ordinary symptoms are slight, dryness or irritation appearing when the voice is used, and subacute attacks following exposure of any sort or increase of autotoxemia. A full meal—Thanksgiving dinner—is sure to be followed by an attack. The patient is often unconscious of a habitual cough or hawking, getting up a little adhesive mucus, especially on rising. The membrane is seamed with scars, interspersed with nodulations and shallow erosions or ulcers. Secretions may be present. Taste, smell and hearing become weakened. The uvula may be lengthened. Headaches and vertigo are common. The veins may be enlarged and tortuous. The pharyngeal tonsil may be enlarged. The general symptoms are those of the sedentary, meat-eating brain-worker with autotoxemia. The diagnosis should exclude syphilis and tubercle. Complete cure should not be promised.

The treatment of this group of conditions has required whole books to describe, and the reader is referred to the works of specialists for minute particulars. The indurations may be touched with tincture of iodine every other day; thymol iodide one part in 16 of pure fluid petrolatum sprayed over the membrane every night and morning, after removing the secretions by salt gargles or mild alkaline lotions; and the alimentary canal kept clear and aseptic in the usual manner. This will secure immediate and decided improvement. If the patient can be induced to properly regulate his diet and take enough exercise, and keep doing this, he will recover insofar as recovery is possible—among the miracles wrought by the newer therapy the rebuilding of atrophied tissues is not numbered.



Lozenges of gum, glycerin or elm relieve dryness by exciting saliva, and keep the membrane moist. Potassium bichromate is credited with valuable properties in chronic infiltrations, and in quelling sub-acute exacerbations. Painting the affected membrane with a 2 per cent solution of brucine five minutes before going on the stage aids public speakers remarkably, freeing them from irritation, clearing and strengthening the voice. A good lozenge is a grain tablet of arbutin, allowed to dissolve as slowly as possible in the mouth. This may be repeated *t. i. d.*, for months with benefit.

Phlegmonous inflammation and abscess sometimes occur in the throat, the symptoms being those of a boil in any locality. The onset is sudden and severe. Respiration may be impeded. The treatment consists in quickly saturating the patient with calx sulphurata, a grain every half hour, with five drops of nuclein solution dropped on the tongue every hour. Clear the bowels with calomel and saline aided by exosmotic enemas. If pus forms evacuate it at the earliest moment.

Retropharyngeal abscess is most frequently seen in children under two years of age, and with caries of the cervical spine, infectious fevers, and rarely from perforation with a fishbone, pin, or other foreign body. There is pain on swallowing, impeded respiration, cough, alteration of voice, obstruction of the esophagus and stiffness of the neck. In infants the latter, with some fever, restlessness, insomnia and other general symptoms, are notable. The pharynx may be seen to project forward. The course is brief except when the vertebra is carious. Death may be caused by asphyxia. In adults the diagnosis should be made from aneurism. The treatment consists of quick saturation with calx sulphurata and nuclein, clearing the bowels, and evacuating pus as soon as its presence is detected. Caries demands the supporting treatment also.

## VI. DISEASES OF THE ESOPHAGUS

### ESOPHAGITIS

Acute catarrh of the esophagus results in the production of sponginess and desquamation of the mucosa instead of mucous secretion. The glands may break down into ulcers, erosions may form, or an exudate appear in the lower segment. Submucous suppuration may dissect up the mucosa. Corrosive poisons may destroy the whole or parts of the tube's thickness. Fibrinous casts have been ejected by hysterics. The cause is generally traumatism, mechanical, thermic or chemical irrita-

tions, extension from the pharynx, specific infections, smallpox pustules, and local disease like cancer, abscess or laryngeal caries. The symptoms are a dull steady pain beneath the sternum, difficulty in swallowing, regurgitation of food, and discharge of mucus, blood and pus. Ulceration or necrosis may follow. The diagnosis may be confirmed by passing an esophageal sound.

Rectal feeding may be requisite. The treatment is conducted on general principles, attempts being made to abort the attack when feasible, by calx sulphurata and nuclein.

Chronic esophageal catarrhs may be due to extension, continued irritation, or passive congestion from cirrhosis or chronic cardiac disease. Nausea and eructations may be caused by mucous secretions. All varieties of esophageal inflammation are singularly rare.

Esophageal ulcers may arise from catarrh or gangrene, and may form in bedfast persons opposite the cricoid cartilage. Pus may be discharged into the tube or the mediastinum. Stenosis may follow. Peptic ulcers may form here. Passage of a bougie reveals local points of tenderness and maybe pus and blood. The treatment is symptomatic and general.

## ESOPHAGEAL CARCINOMA

This is the most frequent disease of the esophagus. It is primary, epithelial, beginning in the mucosa and encircling the tube, narrowing its lumen and often causing dilatation above the obstruction. It is usually in the lower third, where the left bronchus crosses. Males, over 40, are the most usual victims. The causes surmised are continued irritation as in the case of drunkards, and the presence of scars here from peptic ulcers.

The first symptoms are those due to beginning stenosis as the tube is narrowed. This steadily increases until only liquids can be swallowed, and regurgitation occurs. Pain may be marked. Food, and when ulceration has occurred blood, pus and cancer tissues may be ejected. Obstruction may temporarily subside when the mass breaks down. Secondary growths develop in the lungs, liver, etc. The cervical glands may be affected. The general symptoms are some fever with progressive wasting and cachexia. The deprivation of food may cause the blood to show an excess of corpuscles to its bulk.

The duration seldom exceeds eighteen months, much less in soft cancers, the patient dying of exhaustion. The larynx, trachea and bronchi may be invaded, the pericardium, pleura or aorta be perforated.



The vocal cords may be paralyzed by pressure on the recurrent laryngeal nerve, and gangrene of the lung is not common. The diagnosis is made by excluding other causes of dysphagia: aneurism, foreign bodies, cicatrices, mediastinal and other tumors. The relentless progress of the case is significant. The esophageal bougie is to be employed with caution as harm may be easily done.

The treatment is symptomatic and palliative. Conduragin should be administered, gr. 1-67 every four hours, in solution, as this has proved of value when brought into direct contact with cancerous growths. Rectal feeding is indicated. Gastrostomy prolongs life.

Rarely the esophagus is ruptured, previous softening by autodigestion supposedly occurring. Food and air escape into the pleura, causing fatal inflammation and suppuration. The perforation occurs in the posterior wall of the lower section and is large. Violent vomiting after a full meal is blamed. The symptoms occur suddenly, nausea, very severe vomiting, great local pain, and collapse. Cervical and thoracic emphysema develops. Death is not long coming. No curative treatment.

## ESOPHAGISMUS, DILATATION, STRICTURE

**Esophagismus**, spasm of the muscular fibers, occurs in hysterics, chorea, epilepsy and hydrophobia; rarely primarily. It has been seen in aged hypochondriacs, pregnant women, and following primary esophageal atony and aneurism. Dysphagia occurs, with pain, emotional symptoms and choking. The bougie may pass the tube and be tightly gripped. When the spasm subsides there is no obstruction. The treatment is mainly psychic, and the use of the bougie is specially effective. As the malady is frequently reflex, the source of the hyperesthesia is to be sought.

**Dilatation** occurs above a stricture, after preliminary narrowing from hypertrophy. It may follow esophagismus, or be congenital. The symptom is continual dysphagia, at one point, with regurgitation of food not acidulated unless vomiting attends. The sound detects the dilatation and the stricture below. Feeding may be maintained by the use of Symond's tube, and by the rectum or vagina, the latter more successfully. Contraction may ensue if the stricture is opened and the tube kept empty, and berberine may be given, one to five grains a day for six weeks, to favor this.

Partial dilatation may cause a diverticulum, and this may be congenital. The wall is weak at one point and a hernia forms. Food lodges

in it and enlarges the sac by its weight, and by decomposing sets up disease of the walls. It is most usual on the posterior wall below the pharynx. It may measure four inches in diameter. It is most usual in elderly men, following local injury or disease. Small funnel-shaped traction diverticula also are found in children rarely, following suppuration of the bronchial glands. They cause few symptoms if any—except what are due to the entrance of food. The larger forms are recognized when they cause pressure symptoms, dysphagia, bad breath, nausea and vomiting with associated strangling, and the inanition of denutrition. The sac full of food may be palpated or percussed. Dyspnea, coughing, etc., are caused by nerve pressures.

The sac enlarges when food is taken and subsides when it is ejected. This may be effected by compression with the fingers. Diagnosis with the sound is rather difficult. The x-ray affords a better means. Curative treatment is surgical. Feeding should be by the stomach tube exclusively, as food should never be allowed to enter the sac.

**Esophageal stricture** occurs from epithelioma, polypi, syphilis, tubercle, corrosives, typhoid or peptic ulcers, and congenitally. The symptom is very slowly increasing dysphagia from obstruction. A sense of weight and pressure follows eating, and there is apt to be pain also. At first fluids are taken readily but in time they also are arrested. Muscular atony adds to the difficulty. Tissue may be destroyed by corrosives, and spasm may also occur. In cancer the obstruction is wholly mechanical. Dilatation forms above the stricture. Food arrested is ejected several hours after meals, and is alkaline. Debility and emaciation progress from lack of nourishment. Diagnosis is made by use of graduated sounds. First spray with cocaine to prevent spasm and vomiting; put the patient on a low seat, his head supported by an assistant behind him, and slightly held back; the operator stands in front of him, the left index finger passed into the mouth to locate and avoid the epiglottis; the bougie is guided into the tube. It may be gripped by spasm at the level of the cricoid cartilage, passing with a jerk—no force is permissible—or be arrested, and a smaller size must be substituted. In locating the strictures, from the teeth to the cricoid cartilage is about seven inches, the left bronchus eleven, the diaphragm fifteen. The diagnosis as to the nature of the obstruction is to be made. External compression causes moderate obstruction; aneurisms may communicate rhythmic movement to the sound pressed against the obstruction, and will afford other pressure symptoms. Spasm and paralysis occur in hysterics and rarely afford other than intermittent obstruction. Cancers occur in elderly men and simple forms have their peculiar history.



Dilate the stricture by the gradual introduction of graduated sounds, the softer being safer. This should be repeated daily and the patient should be taught to do it himself. This applies specially to cases following corrosion or ulcers. Feeding should be through a stomach tube if it can be introduced, or by rectum and vagina. Surgical intervention may be required.

## VII. DISEASES OF THE STOMACH

### STOMACH TROUBLES—GENERAL CONSIDERATIONS

There are few troubles to which human flesh is heir more common than those which affect the alimentary tract; yet there are few with which the general practitioner is, as a rule, so unfamiliar. This is a strange condition of things, for aside from the "revenue" to be derived from the treatment of ailments of this class it has become almost axiomatic that a large proportion of the diseases of other organs, and especially those to which we give for convenience, the name of "diseases of metabolism," are directly or indirectly due to dietetic and consequently digestive faults. A thorough knowledge of digestive diseases may be the key to many a vexing problem.

The cut and dried favorite prescription of something "good for dyspepsia" is the rule, I fear with most physicians; some know of "dyspepsia" only; while many divide their cases into two classes—gastritis and nervous dyspepsia—but with no very clear conception of the therapeutic indications which even such a simple classification might point out. Usually the patients all get a mixture of nux, pepsin and some aromatic; though once in awhile hydrochloric acid is prescribed, and not infrequently the ancient prescription of an alkali before meals under the long-since-dead hypothesis that it will stimulate a flow of the acid gastric juice.

I believe that this failure to grasp the essential principles in the treatment of stomach diseases is due to the apparent complexity of the symptoms described in text-books, and also to the fact that in practice these symptoms, even of widely varying conditions, on their surface present a confusing similarity. The physician depends for his diagnosis upon what the patient tells him, and in few conditions is this source of information less trustworthy. Every doctor should know how to elicit the objective signs of stomach disease—but he doesn't. The examination of the stomach is fully as easy as that of the chest; yet what doctor would make a diagnosis of pneumonia or pleurisy after mere interrogation of

the patient. How few there are who take the trouble to expose the abdomen, and make necessary tests to get at the bottom of the trouble when the stomach is at fault.

No man should think of treating diseases of the stomach without having some logical conception of the condition of things he is trying to remedy. The symptoms of chronic gastritis and hyperchlorhydria may seem to be very much alike; yet the treatment which would be indicated for one would be anything but beneficial to the other. Diagnosis, therefore is essential, and correct diagnosis cannot be made without the tools. The laboratory equipment may seem formidable but after all it is simple enough, provided one sticks to essentials and does not try to do too much. Given familiarity with the use of the stomach tube and the mastery of two or three simple tests and the general man will do very well in the vast majority of his cases. Why the siphon tube should be such a *bête noir* to so many is hard to understand. It really is not much more difficult to use than it is to give an enema. Personally I would rather introduce the tube into the stomach than to attempt the high rectal irrigation.

Called to attend a case of stomach trouble the physician should first attempt to answer the following questions:

1. Might the conditions be caused by any trouble external to the stomach, and if so what?
2. Is the stomach normal as to size and location?
3. Is there food stagnation—in other words, does the stomach empty itself with reasonable promptitude?
4. Are the secretions normal or abnormal?
5. Are there evidences of inflammatory change or other morbid condition of the mucosa?

1. Of the exterior conditions causing symptoms of stomach disease the most common are those which interfere with the circulation. Such are heart disease with failing compensation, disease of the liver, especially cirrhosis, disease of the lungs, etc. These all cause passive congestion of the mucosa. Severe anemias interfere seriously with digestion; and on the other hand in many cases they are produced by digestive disease. Morning vomiting should suggest pregnancy. Sudden attacks of vomiting may mean locomotor ataxia. Nausea accompanied with severe blinding headaches should always suggest an examination of the urine—perhaps they are due to uremic poisoning. Occasionally vomiting may usher in the acute diseases such as the exanthemata, indeed it is often the evidence of a severe autotoxemia. Recurring attacks of severe pain in the stomach may be due to biliary colic. An examination



of other organs, especially heart, lungs, liver, an examination of the urine and a careful testing of the reflexes should be made in every suspicious case.

2. The stomach may be dilated (gastrectasis) or prolapsed (gastroptosis). Dilatation of the stomach is caused either by obstruction at the pyloric end or by weakening of the gastric muscle. The obstruction may be either organic or spasmodic; the former is caused by ulcer or other acute inflammatory conditions at or near the valve or the presence or pressure of some growth; more rarely by constricting bands. Spasmodic obstruction is usually due to an irritable condition of the mucosa, usually the result of highly acid secretion. Weakening and thinning of the gastric muscles may follow any severe debilitating condition, in all probability, but most frequently is a sequel of chronic gastric catarrh.

The simplest way to demonstrate dilatation is by giving a seidlitz powder, the blue and white papers being administered separately. Gas is generated in the stomach which is ballooned out so that it is easily outlined by percussion and auscultation. Take care that the colon is not so filled with gas as to confuse your work. Also, if you are suspicious of erosion from ulcer or cancer, avoid distension of the stomach. To determine the motility of the stomach give the patient a half a glass of water; then while he leans slightly forward, by careful percussion outline the lower border and mark the point on the abdomen with a colored crayon; then give more water and notice how much the viscus descends, marking again, then still more as there may be need. Gastroptosis is usually part of a general process—descent of all the abdominal viscera or at least a good share of them; this general abdominal prolapse is called splanchnoptosis. Have your patient stand up with the abdomen exposed to the pubis; a pronounced case of splanchnoptosis, when observed from the side, shows sagging and protrusion of the lower abdomen and a depression in the epigastrium, or just beneath the xiphoid. Glenard's belt sign is useful. From behind the patient grasp the abdomen gently with both hands and "raise up" on it; this gives relief in gastroptosis.

3. Food stagnation means defective motility, usually associated with deficient HCl; however, even when HCl is scanty if the stomach empties itself promptly there may be no indigestion, since the intestine may take up the work in a compensatory way. As a result there will be no stagnation and consequent symptoms of decomposition, even though the secretion may be scanty. Determine the size of the stomach as above. The length of digestion is easily ascertained by withdrawing the contents of the stomach at varying periods after the test meal. Use as described below. The stagnation and de-

composition of food should never be allowed to go unrecognized for it demoralizes the whole digestive tract and causes many distressing symptoms.

4. While the revelations of the laboratory are by no means infallible, they throw more light upon the condition of the stomach than anything else. Of first importance is to learn the amount of HCl secreted. The normal percentage after a test meal is, in Americans, from 0.15 to 0.2 per cent. In Asiatics and others living habitually on a vegetarian diet the percentage is normally lower. An increase in the secretion of HCl means an irritable condition of the stomach; a decrease of HCl a depressed condition, and this deficient secretion is present in practically all chronic inflammations.

An increased percentage of HCl usually means either hyperchlorhydria or ulcer. When the acid is diminished or absent the trouble may be gastritis, cancer, or any one of a variety of neuroses.

This brings us to the use of the stomach tube. This simple instrument is simply an "overgrown" soft rubber catheter, 30 inches in length. It may have a pump bulb or not, as preferred. The physician should have several tubes of different sizes. They are not expensive. Usually a moderately large one is introduced more easily than a small one. Scrupulous cleanliness is imperative. After use the tube should be carefully washed and a hot solution of soda and water allowed to run through it until it is clean inside as well as outside. It should then be placed in a wide mouthed jar filled with glycerinized water made slightly antiseptic with carbolic acid. Rinse again before using. To introduce the tube direct the patient to lean slightly forward with the mouth open. The tube should be held in the left hand and introduced with the right, the end being held like a pen between the thumb and two first fingers. Introduce it gently until it touches the posterior pharynx, then tell the patient to swallow, meanwhile pushing it onward very gently. Use no force; it will go forward easily enough. On the first introduction the patient will gag and endeavor to reject the tube, but this soon passes. Use tact; reassure him and do not be in a hurry. After the first introduction there is little trouble.

Many test meals are given in the books, but the Ewald-Boas meal meets all usual needs for the general practitioner. It consists simply of a slice or two of dry bread or a roll eaten with a glass of water or a cup of weak tea, without sugar, cream or butter. It must be taken on an empty stomach and the product of digestion remaining should be withdrawn with the tube in an hour. If digestion has been fairly good all that will remain is a few ounces of straw colored liquid, mixed slightly



with mucus; if digestion is feeble, broken down and partially digested food fragments will be found with more or less mucus, epithelial debris and possibly blood, while the microscope may show bacteria and fungi of various kinds.

There are many chemical tests in use, but the following three will answer the purposes in general practice: (1) the dimethylamidoazobenzol test for HCl; (2) the phenolphthalein test for total acidity; and (3) the ferric chloride test for lactic acid.

In making quantitative tests it is necessary to use what is called an *indicator*; this is a solution of some substance which changes in color when the reaction changes from acid to alkaline, or the reverse. Also we must have a carefully measured percentage solution of an *alkali* which serves as a "measuring stick"; for this purpose what is called a "decinormal" solution of NaOH is usually employed. A normal solution is one which contains in every liter as many grams of the substance as its molecular weight. For instance, the molecular weight of NaOH is 40; hence a normal solution of NaOH would contain 40 grams to the liter; but as these quantities are often inappropriate for making solutions it is the custom to use *decinormal* solutions, one tenth of this strength in the case of the NaOH or 4 grains to the liter.

Now for our test for free HCl: Having carefully filtered the fluid we have withdrawn from the stomach we add to a carefully measured quantity (10 Cc) two to three drops of our indicator, dimethylamidoazobenzol in 1-2 percent alcoholic solution. This turns the gastric filtrate a vivid red. From a graduated burette we now add drop by drop, shaking or stirring carefully from time to time, the decinormal NaOH solution until the red color fades entirely away. This fading of color means that the acid is neutralized. The amount of the NaOH used gives us a basis for computation. For instance, if 6 Cc of the NaOH solution are required to neutralize 10 Cc of the gastric filtrate it would take 60 parts to neutralize 100 Cc. Or the acidity may be stated at 60. If it is wished to state this in percentage the 60 is multiplied by .00365 the quantity of HCl in a gram of decinormal HCl solution. (This factor may be easily remembered as it is the same as the number of days in a year.) Given a free acidity of 60, the percentage acidity would be 0.219.

But HCl does not exist free in the stomach alone; some of it has entered into combination with various bases and formed chlorides, while other portions have combined with albumen to form peptones, etc. In addition there may be other acids. To get some idea of the total work of the stomach therefore it is well to determine the *total acidity*.

For this our indicator is the phenolphthalein. This is used exactly as the dimethylamidoazobenzol is used, but instead of reddening the acid solution it causes no change in color until the NaOH is added. This turns it red. When enough of the alkali is added to cause a permanent and uniform red color after shaking, the acidity is neutralized and the quantity and percentage may be computed exactly as already described. To determine just when the reaction is completed requires a little experience, for the change of color is not sudden but gradual. It is the custom to state free HCl acidity in percentage and total acidity in terms of the neutralizing agent. Thus in a given case we may say that the HCl was found in a percentage of 0.18, and the total acidity (all the acids free and combined) was 70.

When cancer of the stomach is suspected the filtrate should be examined for lactic acid which is found in excess in this condition. The test meal here is oatmeal gruel without sugar or milk. (This meal is used because wheat bread and most foods contain milk sugar).

The solution used consists of a strong ferric chloride solution in 10 Cc of a 1 per cent solution of carbolic acid. When this is added to the gastric filtrate a violet-color liquid is formed which becomes lemon-yellow in the presence of lactic acid. To avoid complications from the presence of other substances the lactic acid should be extracted with ether, then evaporated and a watery solution made for test purposes.

5. Inflammatory changes of the mucosa, in other words "catarrh of the stomach," are suggested by decided and permanent reduction of HCl, as determined above. This suspicion may be verified by a macroscopic and microscopic examination of the gastric content. The presence of mucus in considerable quantity practically always means gastritis. It is only absent in gastritis when the disease has advanced to the point of destroying the mucous lining. Also, a microscopic examination will show more or less degenerated and broken down epithelial cells and usually bacteria, yeast cells, sarcinae, etc. Blood is not infrequent and usually means either ulcer or cancer.

Before entering into an extensive investigation of the signs of disease the physician has of course interrogated his patient concerning his symptoms. These often give valuable if not infallible information. The patient should elicit the following facts:

1. The family history, especially as regards stomach disease and "nervousness."
2. The duration of the trouble.
3. The coexistence of any intercurrent disease or other troublesome symptoms not referred to the stomach.



4. Is there pain; if so does it come immediately after meals or at some distance after eating? Is it relieved or increased by taking food?

5. Nausea and vomiting. At what time of the day do they occur, how soon after meals, and what is the nature of the vomited matter?

6. Points of localized or general tenderness, to be verified by physical examination.

7. Is there constipation or diarrhea?

In many cases the diagnosis will be fairly clear after careful interrogation, and the patient may be placed upon a tentative treatment with reasonable hope of benefit. But in severe cases of long standing it pays to be thorough.

Having elicited all the facts possible in the methods described how shall we utilize them? By putting two and two together we can now form a pretty accurate estimate of the condition, even if we are not quite sure of the name it should go by. Let us see what is meant by the various symptoms-complex:

**Hydrochloric Acid Excess:**—This is due in the vast majority of cases to one of two things: Hyperchlorhydria, the most common of causes of indigestion, or gastric ulcer. (Rarely "acid gastritis" may cause it but the dividing line between it and hyperchlorhydria is somewhat vague.) To differentiate: The pain in *hyperchlorhydria* comes at the height of digestion, one to three hours after eating, is relieved by taking food and by the use of alkalies. *Gastric-ulcer* pain commences as soon as anything is taken into the stomach and only ceases when the stomach is empty. The patient often has blood in the vomitus and occasionally in the stool. Localized tenderness in ulcer, absent in hyperchlorhydria.

**Hydrochloric Acid Reduced or Absent:**—This is probably due to one of three things: Gastritis, cancer, or a neurosis of defective secretion (hypochlorhydria). To differentiate: Diffuse pain increased by taking food; no hemorrhage; vomiting quite common, morning vomiting in alcoholics; vomit contains mucus; no lactic acid; nutrition impaired but no rapid emaciation—these are observed in *chronic gastritis*. In *cancer* there is constant pain; lactic acid is present, HCl being often entirely absent; generally a tumor may be felt; blood, grumous vomit and stool; rapidly developing emaciation. *Hypochlorhydria* is more common in the young than the preceding; no hemorrhage; percentage of HCl is variable; vomiting not a prominent symptom; no mucus; general and local symptoms of neurotic type.

**Pain and Tenderness:**—The severity of the pain, it should be kept in mind, is no safe guide as to the severity of the disease. The loudest

complaints are made by the neurotic. In *ulcer* the pain is sharp, acute, and dependent upon the presence of food; it appears as soon as it is taken into the stomach, while it is accentuated by the highly acid secretion; vomiting brings relief; there is associated localized tenderness, often a spot not larger than a silver dollar; inquire concerning blood in vomit and stool. In *gastritis* the pain is dull, more a sense of discomfort, and the tenderness is diffuse; discomfort comes on soon after eating and is associated with gas distention. In *cancer* the pain is more nearly constant, food may cause discomfort and vomiting, but is not itself the cause of the pain; grumous vomit; a tumor; tenderness on pressure; emaciation. In *hyperchlorhydria* the pain comes on one to three hours after eating and is relieved by taking proteid food and by alkalis; acid eructation (heartburn) and diffuse tenderness.

**Vomiting and Vomit:**—Remember first that vomiting may occur without disease of the stomach itself; witness the vomiting of pregnancy, the gastric crises of locomotor ataxia and the projectile vomiting of cerebrospinal meningitis; moreover, in *gastric neuroses* where the affection of the stomach is relatively slight the vomiting may be the most troublesome symptom, resulting from an exaggerated sensitiveness of the organ. Vomiting in the morning before taking food is a prominent symptom of *alcoholic gastritis* (as well as of the early months of pregnancy.) In *acute gastritis* and on occasions in *ulcer* food is rejected as soon as it is taken and painful retching may follow after emptying the viscus. In *hyperchlorhydria* vomiting is not a constant symptom, and when it does occur is more likely to be the regurgitation of intensely acid fluid. In chronic *gastritis* the vomiting is likely to be delayed until fermentation and its consequent distress occurs—an hour or two; the vomited matter is often large in quantity and consists of undigested food, sour or foul smelling, frothy and mixed with mucus.

**Hemorrhage:**—Blood is found in the vomitus, as a rule, only in two conditions: *Ulcer* and *cancer*. Rarely, in gastric catarrh the vomited matter may be slightly streaked with blood from capillary hemorrhage. If the blood is bright and considerable in quantity the presumption is that it is arterial. In most cases, however, it is dark and partially digested—therefore venous or capillary; this is particularly the case in cancer, where it is dark and “coffee ground” like in appearance. If not rejected by the stomach it may pass into the intestine and appear in the stool. Duodenal ulcer presents strong points of similarity to gastric ulcer; here the blood appears in the feces and is usually absent from the vomit. Blood from the lungs or throat may be swallowed and simulate hemorrhage from the stomach.



**Condition of the Bowels:**—*Constipation* is the rule in nearly all diseases of the stomach. It is especially marked in *hyperchlorhydria* the excess of acid passing into the duodenum seeming to neutralize the alkaline secretions of this part of the intestinal canal and interfere with normal activity. In *chronic gastritis* there is often an *alternation of constipation and diarrhea*; this is due to the fermentation and other retrograde changes of the fecal mass, which give rise to irritant substances which stimulate peristalsis; the feces are peculiarly foul. If there is associated *intestinal indigestion* the fecal mass will contain *undigested food*, especially fats. Examine for blood when you suspect solutions of continuity.

**General Conditions:**—In *hyperchlorhydria* the digestion is good and the nutrition of the patient does not suffer unless there is excessive vomiting preventing the taking of a sufficient quantity of food, or unless the patient starves himself on account of the pain following eating. In *gastritis* there is *cachexia*; the complexion becomes sallow and muddy often there is considerable anemia and the weight declines, though not excessively as a rule. In *cancer* the loss of weight is rapid and there is associated the peculiar waxy cast of countenance of malignant disease in the majority of cases. In the *neuroses* generally the symptoms are of a *neurotic type*, varying greatly from day to day. The exhaustion symptom of neurasthenia or the hysterogenic zones of hysteria are to be sought.

#### DIET

In all forms of stomach diseases the patient should be impressed with the importance of the following points:

1. The food must be simple; the mixing of all kinds of things in a single meal, as in the ordinary course dinner, is a digestive danger.
2. Frugality. Overeating is the source of most of our bodily ailments.
3. Thorough mastication. And this means that the patient must take time to eat—must make a serious business of it—while aiming to get the utmost satisfaction out of the function.

Of course there are other things of importance, such as the careful preparation of food, the avoidance of fried food, the value of fluid and its proper apportionment to the meals (often large quantities of water or other liquids are drunk while eating simply to wash the food down—with proper mastication this would cease to become a necessity), the proper adjustment of proteid, carbohydrates and fats, whether a milk, cereal or meat diet is to be advised, etc. All these things may be

important on occasion, but it is not wise, on general principles, to lay down too extensive rules. The main essential is to live a simple and frugal life.

Recent studies by Pawlow, the great Russian student of the physiology of digestion, have shown the dependence of the stomach digestion upon psychic influences. We all know how the mouth will water at the smell or even the suggestion of some appetizing dainty. Pawlow has shown there is a similar response in the stomach to these same influences, the sight of properly and appetizingly prepared food, as well as the smell or even the verbal description, exciting the flow of gastric juice—or as he calls it, the “appetite juice.” This emphasizes especially the importance of making meals attractive, by proper cooking, proper serving, and of bringing the mind upon the meal; the lunch-counter style of dining, in which the individual swallows his meal in haste (to repent at leisure) while he talks business to his elbow-neighbor, is unphysiologic and courts digestive disaster, with all the metabolic evils which follow in its train.

While we have not the time here to descant upon them, attention should also be called to the studies of Fletcher and Chittenden which show that by thorough and complete mastication and insalivation the labor of digestion may be reduced to a minimum, while the quantity of food may be reduced by nearly half. According to Voit the average man doing ordinary work requires from 3,000 to 3,500 calories of food daily. (The calorie is the unit of food energy as measured in heat and is used by physiologists in measuring quantities of food.) These authors showed that it was possible to get along comfortably on half this if the food is chewed to the disappearing point.

#### DIET FOR SPECIAL CONDITIONS

**Hyperchlorhydria:**—Food should be nonirritant and have large combining power with HCl—in other words contain considerable proteid. Irritants, as spices, alcohol and hot drinks forbidden. Milk, stale or toasted bread, well cooked eggs, etc., meet the indication.

**Chronic Gastritis:**—The quantity of HCl being small, the food should be finely divided, or otherwise in a form to utilize to the utmost the HCl and ferments. In some cases milk agrees best with the patient, in other cases finely chopped meat or raw meat that has been rubbed through a sieve does well; in severe cases raw-beef juice. Concentration of proteid food; carbohydrates in unfermentable form, such as simple cereals (toasted bread, zwieback, granose, well cooked wheat foods, etc.) Thorough mastication imperative.



**Dilated Stomach:**—Minimum of weight with maximum of nutritive qualities essential. Therefore no liquid foods. Give concentrated foods; frequent meals. General principles of diet as in gastritis.

**Ulcer of Stomach:**—Food by rectum for a week or ten days until acute stage of ulcer begins to pass; then cautiously by mouth, commencing with milk and gradually adding cereals.

**Cancer of Stomach:**—Concentrated foods, consulting patient's tolerance; beef juice, chopped beef; milk, etc.

**Neuroses of the Stomach:**—Do not pay too much attention to patient's whims and fancies, but avoid, of course, any food unsuited to the gastric chemistry. If HCl is increased, diet as for hyperchlorhydria; if HCl diminished, as for chronic gastritis, but make diet generous and give an abundance of fats, as cream, olive oil, and fat meats, according to tolerance. Meat, eggs and milk nearly always indicated. If these patients can be made to put on flesh not only the gastric trouble but the entire neurotic condition is improved.

#### MEDICINAL TREATMENT

Attention to the condition of the bowels is fundamental, since there is either constipation or diarrhea in practically every case—constipation being the rule. Owing to the stomach trouble a properly laxative diet is often impracticable. In hyperchlorhydria alkalies are indicated and the laxative may be combined with it; for instance, magnesia is an excellent laxative. With it may be combined a little rhubarb, or better still juglandin to generally add tone to the whole alimentary canal. The following is suggested:

Sodii bicarb.....	dr. 1-2
Magnesii carb.....	dr. 1-2
Juglandin.....	gr. 1-6
Cerii oxalat.....	grs. 5
Atropini sulph.....	gr. 1-500

M. Sig. One half to one dram at a dose in water.

The cerium oxalate serves to quiet the stomach prone to irritability and the atropine checks excessive secretion. This formula is also of value in the vomiting of pregnancy. By the addition of a little tartaric acid (taking care not to add enough to neutralize the alkali) it may be given in effervescent combination. After the bowels are brought into proper condition they should be regulated by the use of the anticonstipation pill (Waugh).

In chronic gastric catarrh the first thing is to unload entirely the intestinal tract by the use of small repeated doses of calomel; stimula-

tion of the hepatic areas with iridin or podophyllin also may be indicated, for in this condition of things a large amount of work is thrown upon the liver and it is essential that it should functionate properly. In gastric catarrh the morning dose of saline is indicated; here we need the drainage. These patients nearly always benefit by a residence at the "spas"—simply because they are cleaned out thoroughly and are kept cleaned out.

In the neuroses the bowels should be regulated as far as possible by exercise and diet, but a preliminary cleaning out and the temporary use of the anticonstipation formula will almost invariably do good.

As we have already said alkalies are the indicated remedies in hyperchlorhydria; this holds good also of acid gastritis (which however is not very common). The ordinary domestic remedy, and an effective one, is the teaspoonful of soda in half glass of water. Better is a formula such as we have already described, which has the advantage of at the same time acting as a sedative, laxative and arrester of secretion.

Intestinal antiseptics have a wide field of usefulness in stomach troubles. They are not indicated in hyperchlorhydria, for here the digestion is good and there should be no fermentation or putrescence of food. Nor are they indicated in ulcer—where the indication is for rest primarily, and secondarily for such healing agents as bismuth subnitrate and nitrate or oxide of silver. If the stomach is very irritable they are not well tolerated and may be replaced by bismuth. In all forms of gastritis, however, there is a tendency to the breaking down of food in the intestinal canal and as a consequence the body becomes loaded with toxins. The sulphocarbolates, given well after the close of digestion, are indicated here. If there is much gas formation this may sometimes be arrested by giving the sulphocarbolates with the food. In cancer they are also of great value for similar reasons.

Tonics and reconstructives are indicated in practically all stomach diseases in which there is impairment of nutrition. The arsenates of iron, quinine and strychnine will be found especially valuable. Quinine or strychnine arsenate alone may be sufficient to restore the needed tone, but there is a tendency to anemia in nearly all stomach troubles and in this case the addition of the iron salt is especially desirable. As a cell stimulant there is nothing superior to nuclein. In severe cases with marked debility this should be given hypodermically.

Hydrochloric acid should be administered only when the gastric secretion is scanty or absent. It is therefore indicated mainly in chronic gastritis—never, never, in hyperchlorhydria and ulcer. The dosage is a matter of difference of opinion. Some think that a small quantity



acts as a stimulant to increased secretion; others advise 20, 40, or 60 minims of the dilute acid. Always give it well diluted and let it be taken through a glass tube.

Pepsin is now rarely given in stomach troubles. It is known that in the presence of any secretion of HCl and, sometimes in its entire absence, there is enough pepsinogen to do the work of the stomach. Add HCl and the pepsinogen is converted into pepsin. When it is entirely absent, along with HCl, it is now the custom to treat the stomach as if it were a part of the alkaline intestinal canal, administering pancreatin and soda, which do practically the same work as HCl and pepsin. But do not give the pancreatin and alkali when there is acid in the stomach; it will be inert.

The vegetable digestant, papayotin, including the proprietaries, caroid and papoid, and possibly pineapple juice, certainly have a large field of usefulness in stomach diseases. The fact that they are active in any medium, acid or alkaline, makes them often of use in feeble digestion from any cause. But it certainly is not the part of wisdom to give them when HCl is present—simply because they are not needed.

Tonic bitters are an essential part of the treatment with many physicians, but they are no longer used as much as they were. In cases of feeble secretion from some gastric neurosis (hypochlorhydria) quassin, preferably given in solution before eating, undoubtedly increases the flow of gastric juice. Other bitters have a similar action and carminatives such as piperin, capsicin, etc., may be resorted to in similar conditions with benefit. But in the gastric catarrhs there is a question as to the advisability of resorting to artificial irritants and stimulants; the stomach is already suffering from prolonged overwork and to stimulate it to greater effort may be irrational.

Gastric sedatives may be required in nausea or vomiting. Bismuth subnitrate is one of the best. It should be given on an empty stomach and Fleiner introduced it through the tube, withdrawing water and leaving it in contact with the stomach walls. It is usually used in too small doses. Cerium oxalate is another excellent gastric sedative. In acute cases minute doses of calomel given at frequent intervals do the work. It may be given with small doses of ipecac (or emetine). Carbolic acid, 1-2 gtt. given in peppermint water, is often effective, or creasote in the same dose. In severe cases, morphine hypodermically. Great relief is often obtained from the external use of hot compresses or the hot water bag. (In feeble digestion it is a good plan to lie quietly on the back for an hour after eating with the hot water bag on the epigastrium.) A hot mustard draft on the epigastrium often checks vomiting.

The stomach tube is a therapeutic resource of the utmost value, but its field of application is rather limited. It should be used in all severe cases of chronic gastritis, where there are no contraindications, such as severe heart disease, aortic aneurism or phthisis. It is not indicated in hyperchlorhydria and is positively contraindicated in cancer and ulcer, in which its use would be dangerous. The purpose of the tube is to remove from the inflamed mucosa, all mucus, food fragments, germs and other irritants, so as to give the mucous surface a good rest. It should rarely be used more than once daily. An alkaline or saline solution is usually used for its cleansing value, but medicinal substances may be applied with it, directly to the diseased surface, if so desired.

In conclusion I want to emphasize one point—the importance of rest in the treatment of diseases of the stomach. In acute conditions this is practically all that is needed. The withholding of food for a day or two can do no harm and is often the most certain way to bring about relief. In chronic cases rest is also desirable in as large a degree as is compatible with the maintenance of nutrition.

### GASTROPTOSIS

This term designates a displacement of the stomach downwards. In many if not in nearly all cases there is a similar descent of other organs, the liver, colon, spleen, or kidneys. The general term is splanchnoptosis.

**Etiology:**—It is more common than is usually suspected. Einhorn reported that he found that 347, or 18.15 per cent, out of 1912 cases examined showed some degree of splanchnoptosis. Five-sixths of these were women. The predisposing causes are weakness of the abdominal wall, muscles or suspensory ligaments, and bony deformity. In the majority of instances but not in all this is congenital. There may be arrest of development or a reversal to the fetal type. The infant's stomach is almost vertical and the ascending and transverse colon runs diagonally upward, across the abdomen to the left. In many cases of enteroptosis this position is found. In some instances we find the floating tenth rib as described by Stillé. Rose emphasizes the funnel-shaped or phthisical thorax as an etiologic factor. Rickets also produces alterations favoring splanchnoptosis.

Of exciting causes tight lacing is usually placed first; the corset depressing the stomach and doubling it up, approximating the cardia and the pylorus. Most pelvic maladies are accompanied by ptosis. Frequent pregnancies and any weakening disease that relaxes the abdominal connective, and also rapid loss of fat, in the obese, are often followed by



this affection. Traumatism and pelvic displacements may occasion it. Of Einhorn's 347 cases but two were gastric alone. In 212 the kidneys were loose, the right kidney in 77.3 per cent of the cases. This by its attachment to the colon drags it and the stomach down by the gastrocolic ligament. Hemmeter asserts that all diseases that lead to enlargement and descent of the liver displace other organs as well.

**Symptoms:**—There may be none; but great prolapse and long duration are apt to occasion distress. The digestion is disturbed, the appetite fails, there is a sense of fullness and dragging in the epigastrium, irregular colicky pains, flatulence, eructations, nausea, vomiting and constipation. Dilatation is common but not invariable. Patients complain of weakness on rising, fatigue on short walks, backache and weight in the lower abdomen. Neurasthenia is usual; anemia and debility are common.

The patient is thin, the abdominal parietes flaccid, the lower abdomen protrudes and the epigastrium is depressed. Aortic pulsation is readily detected as the vessel is uncovered. The transverse colon may be detected as a ribbonlike band above the pubic symphysis. When the stomach contains fluid splashing may be heard on succussion. Its outlines may be mapped out by dilating with gas, by the flexible sound, the gyromele, the gastrodiaPHONE or the x-ray.

**Diagnosis:**—is usually easy by studying the symptoms given. Einhorn recommends Glenard's belt test; Standing behind the patient the physician encircles the lower abdomen with both hands, supporting and partly lifting it; if the patient finds relief from this manipulation it favors the diagnosis of ptosis. The disease does not threaten life but complete cure is not common.

**Treatment:**—Tight corsets, belts and heavy skirts suspended from the waist, are forbidden. A well fitting abdominal binder should be worn after confinement until the abdominal muscles have resumed their tonicity. This may be favored by massage, gymnastics, swimming, wheeling, external and intragastric faradization and galvanization. Rose praises rolling a five-pound cannon ball over the belly. Probably no other exercise affects the abdominal walls so well as sawing wood. Cold douches are useful, especially a strong jet of cold water directed against the abdomen while the patient is lying in a hot bath. Rose's plaster bandage is a useful support, or a well-fitting corset that is not drawn too tight. An elastic abdominal supporter gives comfort and prevents sagging. If the patient is thin, the diet should be so arranged as to allow a deposit of fat; if obese and the stomach is dilated, the greatest care should be exercised to prevent the organ being weighed down by a heavy mass of food.

Constipation must be obviated. Digestive difficulties must be carefully treated. The intestinal antiseptics are frequently required, especially zinc sulphocarbolate in doses averaging half a dram daily. Berberine specifically induces contraction of relaxed connective tissues, and should be given for alternate months in doses of one to five grains daily, divided. For anemia the preferable chalybeate is iron chloride, but any preparation may be employed that is otherwise indicated—iron arsenate for malarials, phosphate if there is need of phosphates, etc.

### GASTRIC DILATATION OR GASTRECTASIS

Whenever there is an increase in the normal size and capacity of the stomach the condition is known as dilatation or gastrectasia. Mere enlargement of the stomach, however, is not inevitably the cause of serious symptoms; so long as the motor power of the viscus is retained, so that it is able to empty itself promptly, no trouble may result. Usually there is an associated stagnation of food to which the symptoms are really due.

**Etiology:**—Dilatation is due to one of the following factors: (1) Some obstruction at the pylorus; or (2) weakening of the stomach wall. The pyloric obstruction may be either organic or spasmodic; in the former case due to cancerous growth, the pressure of tumors, the presence of an ulcer with its resulting cicatricial contraction or peritoneal adhesions; in the latter, to excessive irritation at the pyloric orifice resulting in its spasmodic closure—as a result of ulcer or an excessive secretion of hydrochloric acid. Any stenotic condition at this orifice, whether organic or spasmodic, will cause dilatation of the organ.

Perhaps less frequent as a cause is weakening of the muscular wall. The continued overloading of the organ by overeating, or with excessive quantities of liquid, may be the cause of this condition. Anything which interferes with the nutrition of the gastric muscles, as for instance gastric catarrh, will act as a predisposing cause. Gastritis when long continued, by predisposing to gas formation, innutrition, and myasthenia often terminates in dilatation. Conditions of lowered nutrition generally also favor its production.

**Symptoms:**—Mainly those of food stagnation, modified by the condition causing the disease. If pyloric obstruction is due to cancer or pyloric ulcer, of course the symptoms of these diseases will be prominent and may overshadow the complicating gastric dilatation. If the stomach cannot readily empty itself fermentation processes occur, with the formation of gases, as for instance sulphureted hydrogen, carbon dioxide, hydrogen, oxygen, and marsh gas. The gaseous distention causes a sense



of fullness and oppression in the epigastric region, and there are frequent eructations of foul smelling gas, and occasional regurgitations of sour fluid. The appetite is usually absent, though occasionally it is increased; the tongue is coated, the breath foul, the mouth and throat dry, and there is troublesome thirst. Vomiting is one of the most characteristic symptoms of well marked cases. The vomiting may occur daily or only once in two or three days. The quantity thrown up may be enormous. It consists of a frothy mixture of poorly digested food fragments in a turbid, foul, acid liquid. The vomiting gives temporary relief. The vomitus when allowed to stand separates into three layers; a lower one of food debris; a middle one of dirty brownish fluid and an upper one consisting of turbid foam. An examination of the vomitus will show undigested muscle fibers, starch grains, fat globules, etc; also yeast cells and various bacteria.

The quantity of urine is reduced and the urea and chlorides are diminished.

The general health of the patient is more or less seriously affected. There is usually progressive emaciation and there may be serious blood deprivation. These patients become anemic, sallow and hypochondriac. Complications include palpitations and irregularity of the heart, asthmatic seizures, globus hystericus, etc.

Upon *physical examination* the diagnosis is usually easily verified. The outlines of the stomach can be easily outlined by administering a Seidlitz powder, giving the white and blue papers separately, and allowing the stomach to be ballooned out by the gas which is generated. Percussion enables the physician to then outline the boundaries of the organ. Or, instead of the Seidlitz powder, the stomach may be dilated with air pumped in with a bulb syringe, or its lower border may be determined by giving the patient one or more glasses of water which gives a dull sound on percussion. Splashing of fluids may be felt on percussion and heard with the stethoscope, as well as the bubbling, crackling sound due to the evolution of gas. Tumors, or the stenotic feeling of pylorus when the seat of a chronic inflammation, may be detected frequently. Other aids to diagnosis are transillumination with Einhorn's gastrodiaaphane the use of the x-ray after the walls of the stomach are coated with bismuth administered in large doses, Furck's gyromele or flexible rotating sound, and the usual chemical tests for acidity and motility, for the latter purpose the salol test (whose value is doubtful).

**The prognosis** depends upon the cause. Where the cause is a benign one, as muscular weakening due to overloading the stomach, gastric hyperchlorhydria or eyen ulcer, the prospects for recovery are good, under

proper treatment. Cancer of course removes the possibility of permanent recovery. Permanent stenotic changes in the pyloric opening may require surgical measures for their relief.

**Treatment:**—This must of course be adjusted to the cause of the dilatation. The physician should make a careful examination of the stomach contents and adapt his diet and his remedial measures accordingly. In many cases more can be expected from surgical procedures, those which aim to enlarge the pyloric opening or establish a permanent fistula between the stomach and the gut.

The diet is of the utmost importance. It is essential that *it should be concentrated*, so as to have the minimum of weight with the maximum of nutrition. Fluids are generally heavy in proportion to the amount of real food which they contain, hence soups, gruels and even milk are usually contraindicated, though in some cases a milk diet proves beneficial, provided it is not given in too large quantities at a feeding. If there is high hydrochloric acid acidity scraped or minced raw or partially cooked lean meat is usually well borne and answers the purpose. The carbohydrates which are taken should be of a character not to undergo fermentation easily, hence sweets generally are contraindicated. In very severe cases the meals should be small, highly nutritious and relatively frequent, endeavoring however to give the stomach opportunity for rest. In some cases it may be necessary to feed for a time by the rectum. If there is associated chronic gastritis with scanty HCl secretion, feed as directed for that condition, remembering the necessity, as in all these cases, of giving *the maximum of nutriment with the minimum of weight*.

Lavage is perhaps the most useful single expedient in the treatment of dilatation, especially when associated with chronic gastritis. The purpose is to completely empty the organ, remove all irritant substances from the inflamed mucosa and put it in a condition of complete rest. The stomach tube is easily passed, as described in the section on chronic gastritis; after removal of the stomach contents, the organ is washed out with a slightly alkaline and antiseptic solution, to remove mucus and check further tendency to fermentation. It is usually sufficient to wash out the stomach once a day, and the best time is two or three hours after the evening meal so that it may have time for complete rest during the night. Medicinal agents, as a 1 to 1000 solution of nitrate of silver, may be sprayed through the tube.

In some of the milder cases the use of the tube may not be absolutely required. In these cases the best results are obtained by the use of antiseptics in connection with a careful diet. The sulphocarbolates,



best in the form of the combined W-A Intestinal Antiseptic tablet, consisting of the sulphocarbolates of calcium, sodium and zinc, may be given in 5-grain doses after meals. Einhorn recommends for this purpose benzothymol, salol, bismuth and resorcin, but none of these remedies will be found so uniformly satisfactory as the sulphocarbolates. The combined salts may well be given in all cases after every meal, where there is the symptom of gaseous distention. By checking this distressing symptom one important element in the pathogenesis of the disease is removed. In cases attended with insufficient HCl secretion this remedy should be prescribed; if it is excessive in quantity alkalies are called for, as directed in the treatment of hyperchlorhydria.

As a muscular tonifier strychnine is indicated in some of these cases; small doses, gr. 1-67 of the arsenate, may be used and gradually increased. It should be used where there is general myasthenia of the stomach coats, but would be contraindicated where there is spasm of the pyloric muscles. In the latter cases the indications would point toward the use of atropine or hyoscyamine. Hydrastin and quassin would be useful where there is general relaxation of the stomach and its mucosa.

Cohnheim has used with good success in some of these cases, whether due to organic or spastic conditions, large doses of olive oil. Three to four ounces is given as a dose, either through the tube or swallowed, half an hour before meals.

Another remedy which has recently been tried with good results in some cases is thiosinamin. This has the power attributed to it of dissolving cicatricial tissue, and deserves a trial when the stricture is the result of the contraction of the scar tissue in and about the pylorus. It may be administered either internally or hypodermatically; by the latter method the dose is 0.2 to 0.4 Cc. of a 15 per cent alcoholic solution.

It is of the utmost importance to keep these patients properly cleaned out. The tendency is to constipation, and when a fermenting decomposing mass is poured into the bowel, there inevitably results more or less vitiation of the digestive function of the lower bowel and autointoxication from absorption of the decomposing mass. There can be no doubt that the anemia, cachexia and many of the nervous and metabolic disasters of this disease are due to this cause. In commencing treatment it therefore is best to be thorough. Administer several small doses of calomel,  $\frac{1}{4}$  grain each, using with it small quantities of podophyllin and of the bile acids when it is desired to secure gentle stimulation of the hepatic cells. Follow in a few hours with saline laxative in an effervescent form. This should be taken on an empty stomach and should be repeated by preference every morning

or at least every other morning. Be thorough, and if necessary to insure complete emptying of the lower bowel, wash it out with enemas of normal salt solution, so that you can be positively assured that the entire intestinal canal is in the best possible condition. It should be kept as nearly aseptic as possible by the conjoined use of the sulphocarbolates, as already directed.

To Epitomize:—The essential things in an uncomplicated case are therefore: To keep the bowels well cleaned out as just directed; to arrest fermentation and fecal decomposition with the sulphocarbolates; to stimulate the mucosa with quassin and hydrastin and the stomach musculature with strychnine (when not contraindicated); to "brace" with the arsenates of iron, quinine and strychnine, with nuclein as cell toner; to give the most nutritious diet possible, but one which shall have small weight and not generate gases; to give the organ the maximum of rest by the judicious use of the stomach tube.

### ACUTE GASTRIC CATARRH

This term is used to designate inflammations of the inner coats of the stomach which do not penetrate beyond the submucous layers and do not terminate in the formation of pus. An inflammation of this character affects not only the mucus-producing epithelium but also the essential glandular elements of the stomach itself, which furnish the substances essential to digestion.

It is fortunate that in this instance it has been impossible to tie the clinician down to the results of postmortem observations, as the tissues are so markedly altered immediately after death that little has been gained by their study. Fortunately it has been possible to study this condition during life, as was shown by the investigations of Beaumont on St. Martin. The morbid anatomy is that characteristic of other catarrhal inflammations: The tissues are hyperemic, the vessels injected, the affected areas swollen and edematous and slight hemorrhagic points may present themselves. Mucus covers the surface, the secretion of the gastric ferments is diminished and the cells are swollen and granular.

**Symptoms:**—Mainly those of "indigestion." There is, in mild cases, a sense of fullness and discomfort, more or less burning pain, thirst, nausea, eructations and often vomiting. There may or may not be slight fever, though this is generally absent. Leube says that the pulse is increased in rapidity, but that in case of elevation of temperature something else than acute gastric catarrh should be suspected. There is a



diminished secretion of HCl, and lactic and fatty acids are present, along with well marked increase in mucous secretion.

**Etiology:**—These symptoms are usually due to some well-defined cause; in the majority of cases this is some indiscretion of diet, such as overeating, the ingestion of foods which are already partially "spoiled" or inclined to decompose, the abuse of alcohol or the drinking of beverages which are too hot or too cold. In a word, anything which may cause sufficient local irritation will produce gastric catarrh, whether the irritant be chemic, thermic or mechanical. Foreign bodies, swallowed purposely or not, are not infrequent causes of this condition.

**Diagnosis:**—In simple acute "indigestion" this is not difficult, but in febrile attacks accompanied by symptoms of this description it is well to withhold diagnosis until the possibility of some acute infectious malady may be excluded. Typhoid fever, smallpox, meningitis, scarlet fever, etc., may present initial symptoms closely analagous to those described. Children, it should be remarked, are much more likely to show febrile symptoms as the result of an acute gastric disorder than adults.

**Treatment:**—This is comparatively simple. The entire intestinal canal should be emptied at once and the stomach put at rest, by abstinence from food until the inflammatory condition has subsided. Remove any irritating matter from the stomach, preferably by the stomach tube; in lieu of this, in mild cases, a mild emetic may be administered. A draught of warm water may be sufficient and serves to wash out the stomach. If the water is slightly alkalized, either by the tube or without, it will serve to aid in the removal of any tenacious mucus. In some cases a hypodermic of apomorphine may be necessary, avoiding the possibility of undue depression by the conjoint use of strychnine or digitalin.

The bowel should also be immediately cleaned out. Use an enema, with saline solution. Small doses of calomel,  $\frac{1}{8}$  grain or less every half hour will not only produce free catharsis but help to settle the stomach. When the digestive tract is thoroughly cleaned out from one end to the other the vomiting and other symptoms usually promptly subside. Then follow up promptly with a saline laxative, eff. magnesium sulphate. Bismuth helps to relieve nausea and in severe cases small doses (1-10 to  $\frac{1}{2}$  drop) of carbolic acid or cocaine (1-67 to 1-12 grain) may be tried. The following gastric sedative combination is good: Resorcin, gr. 1-40; cocaine mur., gr. 1-100; atropine sulph., gr. 1-2500; delphinine, gr. 1-1000. A sinapism or a hot turpentine stupe applied to the epigastrium will often control the nausea. Where other means fail a hypodermic injection of morphine and atropine will usually be found effective.

Withhold all food until the symptoms are ameliorated and then feed cautiously with non-irritant and semi-liquid foods until the digestive organs are again able to take up their regular work.

### PHLEGMONOUS GASTRITIS

This exceedingly serious, but fortunately rare disease of the stomach is characterized by the presence of a suppurative process in the mucosa of the stomach. It may be a primary idiopathic disease and in these cases the cause is obscure; or it may be secondary, a metastatic process occurring in the course of some acute form of sepsis, as puerperal fever, pyemia or some severe infection. Osler describes two forms: a diffuse septic inflammation; and a localized gastric abscess.

The symptoms are those of sepsis: Fever, occasionally alternating with chills, weak, thready pulse, collapse, delirium and coma preceding death. There is pain in the stomach, abdominal pain, with meteorism, diarrhea. Vomiting is present but the vomitus, strangely enough, rarely contains pus. Sometimes there is jaundice. The diagnosis is exceedingly difficult if not impossible. These patients usually succumb.

The treatment is entirely symptomatic. The bowels should be thoroughly cleaned out and kept as antiseptic as possible by enemas containing the sulphocarbolates. Saturation with calcium sulphide is indicated where it can be retained. Support with strychnine arsenate, digitalin and glonoin is of course indicated. Ergotin has recently been suggested for these cases and since it can be administered hypodermatically it should be given a trial.

### TOXIC GASTRITIS

This form of gastritis is due to the swallowing of toxic or corrosive agents, such as strong acids or alkalies, phosphorus, arsenic, corrosive sublimate, etc. Carbolic acid is a favorite poison and caustic very frequently taken for suicidal purposes. All of these substances set up a destructive inflammation, varying according to the nature of the noxious agent and the amount ingested.

The symptoms which present in these cases are violent pain in the stomach, difficulty of swallowing, vomiting, the vomitus often blood stained and presenting characteristic evidence of the poisonous substance. There is also, in severe cases, collapse, feeble pulse, cold clammy sweat, etc. Sloughing not infrequently occurs and the broken down tissue may be found in the vomitus.



The treatment is addressed to the cause. Consult works on Toxicology. The proper antidote should be given and after proper emptying of the digestive tract and the support necessary to retain what vital force remains, the stomach should be placed absolutely at rest and rectal feeding given until the inflammatory reaction subsides.

### CHRONIC GASTRIC CATARRH

**Etiology:**—Chronic catarrh of the stomach in most cases is caused by errors of diet, especially by eating food which is irritating; either too rich or too coarse; too hot or too cold; imperfectly masticated, bolted whole, eaten at irregular and inopportune hours, or too highly flavored with spices or condiments. The use of alcohol in large quantities is especially prone to produce catarrh of the stomach and by many is considered its most frequent cause. While it undoubtedly causes some of the most exaggerated types of this disease it is now recognized that a still larger porportion is due to the more common indiscretions of diet which we have mentioned.

Predisposing causes include anything which causes a local venous congestion, such as is likely to follow obstruction of the vena cava or the portal circulation. These include diseases of the lungs, heart and liver. Anything which impairs the general nutrition and causes general debility may also act as a cause; under this head we include the more severe forms of anemia, tuberculosis, syphilis, gout, diabetes, malaria, etc.

**Pathology:**—The morbid anatomy of chronic gastric catarrh resembles that of inflammation of mucous membrane anywhere in the body. The mucosa is swollen, its vessels injected and there are here and there points of slight ecchymosis. As the inflammation progresses there is infiltration of the connective tissues with resulting overgrowth. The stomach shows an increased secretion of mucus which adheres closely to its walls. The tubular cells soon become swollen, Cloudy swelling sets in and degeneration ensues, the glandular crypts becoming clogged with epithelial debris. Finally, as a result of this degenerative process and the contraction of the connective tissue, the glandular elements are gradually destroyed, at first by individuals, then in small areas, the destructive process in the end wiping out, in rare cases, practically all of the secreting surface of the stomach.

While the muscular structures of the stomach are not at first directly affected, in the course of time their energy is impaired and they become incompetent to do the work intrusted to them—the prompt emptying of the stomach at the close of the normal period of digestion.

**Symptoms:**—In the majority of cases the symptoms of gastritis depend upon the following factors: (1) The reduction of the HCl and ferments (pepsin and rennin); (2) the accumulation of mucus and (3) deficient motility which causes stagnation of food.

The presence or absence of HCl in the stomach should be determined in every case in which it is not contraindicated (cancer or ulcer of the stomach, advanced disease of the lung or heart and aortic aneurism) by the use of the test meal, which is to be withdrawn by the stomach tube and examined for HCl. The meal most frequently used for this purpose is that of Boas and Ewald consisting of a dry roll or a slice of bread with a glass of water or a cup of tea drunk without sugar or milk, taken on a empty stomach. At the end of forty-five minutes or one hour this should be withdrawn and the quantity of free HCl is determined by the dimethylamidoazobenzol test. The percentage of this acid in health varies from 0.15 to 0.25 per cent. The total acidity due to free and combined acids, may be determined by the phenolphthalein test. The technique of these tests will be found in any good work on diagnosis. Every physician should familiarize himself with these simple tests; they are easily made, require no special skill, and yet throw great light upon the recognition of diseases of the stomach, and therefore aid in their successful treatment.

In chronic gastric catarrh there is almost always a reduction of the HCl and in some cases—those in which the secreting gastric glands have been entirely destroyed by the inflammatory process—the HCl is entirely absent. On the other hand it cannot be denied that there are occasional cases, described as *acid gastritis*, in which the amount of HCl is not diminished and may be increased. Boardman Reed in his excellent work upon the "Diseases of the Stomach and Intestines" lays much stress upon these cases, which he believes to be relatively frequent. Other authors, however, consider acid gastritis a very uncommon disease and that is the experience of most of us. The majority of these cases are undoubtedly a secretory neurosis which we have described under the term Hyperchlorhydria (which see) or at least transitional states, since prolonged excess of HCl is likely to result in a more or less chronic inflammatory reaction. In cases of acute gastritis there is also an increased secretion of mucus; thus they differ from the secretory neurosis, hyperchlorhydria.

Mucus is invariably found in the stomach washings or vomitus, with the rare exception of cases in which the inflammation has progressed to the stage of the complete destruction of the secreting membrane. In such cases, there is of course no mucus to be found, as there is no HCl



or pepsin. These cases of *achylia gastrica* with complete destruction of mucosa are, however, uncommon.

In examining stomach washings or vomitus remember that there is normally some mucus found; but when it occurs in extensive glairy sticky masses or strings, then there is presumptive evidence of a catarrhal inflammation. Associated will be found, upon the use of the microscope, epithelia, sarcina, yeast fungi and bacteria.

Early in the disease, while the musculature is still unimpaired, there may be no symptoms of the disease, for if the organ empties itself promptly into the intestines, the lower portion of the digestive tract is able to take up the work which has been partially completed in the stomach, so that no impairment of health will be apparent; but sooner or later, in the majority of cases, the energy of the muscles becomes lessened. The result is food stagnation and to this most of the symptoms of which the patient complains are due. The food is retained in the stomach until it undergoes various fermentative and putrefactive changes. There is gas formation, causing a sensation of fullness and discomfort. Organic acids are formed which add to the discomfort. Other results are more or less diffuse tenderness and burning pain, nausea, vomiting, a broad, coated tongue, often reddened at the tips and sides, an impaired or irregular appetite with a craving for acids and salted foods, thirst, salivation, regurgitation of food, belching of gas, heartburn, etc. As a result of the absorption from the intestinal tract of the products of this imperfect digestion the patient presents the symptoms of autoxemia, such as headache, dizziness, insomnia, physical and mental depression; he is easily fatigued, complains of palpitation of the heart and possibly of dyspnea—these symptoms leading him to believe that he suffers from disease of the heart

When food stagnation persists the muscles of the stomach become permanently thinned and weakened and *dilatation or gastrectasis* is the result. The accumulation of food or fluid or the accumulation of gas, now intensifies the distress and adds to the seriousness of the disease.

Vomiting is a common symptom. It may occur from half an hour to two or three hours after meals, but in persons who use alcohol to excess (alcoholic gastritis) there is *morning vomiting*; the patient upon rising throws up a large amount of frothy fluid mixed with much mucus and some food debris; then, after his morning "nip", he feels equal to the rares and labors of the day. "Morning vomiting" is considered quite characteristic of alcoholic gastritis—indeed, a large percentage of alcoholics reach this stage sooner or later.

Prolonged gastritis invariably results in impairment of nutrition especially when, as is likely to occur sooner or later, the compensatory power of the intestine fails. Then there are likely to ensue bowel troubles, especially diarrhea alternating with constipation. The skin becomes sallow, dry and rough. As the HCl secretion is diminished the urine is high colored and remains permanently acid; the patient loses flesh and becomes debilitated and anemic. It is an interesting fact that a large portion of the cases of pernicious anemia, so-called, are associated with atrophic catarrh of the stomach. Whether this is a cause of the anemic state or is coincident with it, has not yet been determined.

**Diagnosis:**—In chronic gastric catarrh we should keep in mind the following points: (1) that there is a diminished HCl secretion; (2) increased secretion of mucus; (3) a tendency to stagnation of food and gastric dilatation.

Decrease of HCl occurs occasionally as a neurosis (hypochlorhydria) but in the neurosis there is never an increased secretion of mucus, as in chronic gastritis, and the amount of HCl in the majority of cases varies considerably from time to time; in gastric catarrh it is fairly constant.

In cancer of the stomach there is also a diminished secretion of HCl and there may be also considerable mucus, but the mucus is usually mixed with blood, making a dark and grumous mess, the so-called coffee-ground vomit. Moreover, the pain of cancer of the stomach is much more severe, much more constant; there are cachexia, rapid loss of weight and usually a tumor that can be detected upon examination. In cancer, moreover, while HCl is usually absent, or at least greatly reduced, lactic acid is greatly increased.

Probably no disease of the stomach is so often diagnosed as gastric catarrh as hyperchlorhydria and yet the two diseases are not a particle alike and the treatment is almost diametrically opposed. In hyperchlorhydria we are dealing with a disease in which there is no marked change of structure if there is any; in gastric catarrh there is marked alteration of the mucosa. In hyperchlorhydria there is an increase in the amount of HCl secreted; in gastric catarrh there is a decrease. In hyperchlorhydria the digestion is only slightly impaired, not at all, as regards proteids; in gastric catarrh the digestion is very much impaired and that of proteids is peculiarly weak. In hyperchlorhydria there is no excess of mucus; in gastric catarrh there is a decided excess. In hyperchlorhydria the pain comes on one to three hours after meals, at the height of digestion, and is due to the irritation of the caustic acid; in gastric catarrh the pain comes on soon after eating and is due quite as much to the distention of the stomach with stagnated food, and to the gases



which are developed in it, as to any local irritation. Hyperchlorhydria is relieved by partaking of food and the use of alkalis; neither of these modifies the discomfort of gastric catarrh—except for the worse. These two diseases make up the vast bulk of the stomach diseases which the physician is called upon to treat. It is therefore vastly important that he should be familiar with their pathogenesis and symptomatology that he may treat them intelligently. The absurdity of “stock prescriptions” for the treatment of “indigestion” or “dyspepsia” cannot be too strongly insisted upon. Every physician should know what he is treating. The standard formulas of “nux,” pepsin, hydrochloric acid and the bitter tonics have a very restricted usefulness.

Ulcer of the stomach is more common in young women while chronic gastritis occurs in older people. In ulcer there is increase of HCl, severe pain on taking food, and definite local tenderness; the tenderness in gastritis is diffuse. In ulcer there are usually hemorrhages and these are uncommon in gastritis, and when they do occur, slight.

**Prognosis:**—Chronic gastritis is a serious disease and deserves careful attention. If allowed to develop it may, and often does become a fatal disease, setting up, as a result of the profound disturbance of nutrition, a weakened state in which the body is incapable of resisting the incursions of disease. We have already referred to its relation to anemia. It is also true that, in all probability, chronic gastric catarrh is a precursor of such serious visceral diseases as cirrhosis of the liver, for instance. If treatment is instituted before profound alterations of structure have resulted the outlook is good for its arrest but it should be remembered that no treatment can restore tissues once destroyed.

**Treatment:**—In chronic gastric catarrh the first aim should be to minimize or remove the causes which have produced the trouble. In case the disease is due to disease of the heart, lungs or liver these organs should have first attention. To relieve the passive congestion under these conditions remedies which raise the arterial tension, such as digitalin, strychnine, etc. are indicated; while drainage into the intestine by the administration of saline laxatives is particularly indicated in cirrhosis of the liver.

In most cases, however, the trouble is due to some vice in diet or the abuse of alcohol. An effort should be made to secure the correction of these faults, for so long as the cause persists no permanent benefit can be anticipated. The delusive advertisements of pills and potions which promise to make it possible for the dyspeptic to “eat anything and everything” are worse than a delusion, since they persuade the patient to persist in the evil habits which are the cause of his ill-health.

The *indications* for treatment briefly epitomized are as follows: (1) To prevent further irritation of the already inflamed mucosa; (2) to raise the nutrition by selecting food capable of digestion by the feeble gastric juices; (3) to combat food stagnation; (4) to prevent auto-toxemia; (5) to secure proper vascular equilibrium.

The *first* indication is met, in most cases, by supervision of the *diet*. To enter into detail we must cover the whole subject of diet and this is by no means an easy matter. No hard and fast rules can be laid down concerning the foods most suitable for the sufferer from gastric catarrh. Each patient requires individual treatment. In general, however, it may be said that the food should not be irritating, that is, contain substances which directly stimulate the mucous membrane. Contraindicated, therefore, are very hot or very cold food or drink, alcohol in almost any form, tea and coffee in the majority of cases, pickles or other highly acid food, spices, condiments and foods which are mechanical irritants such as coarse bread with its attendant bran. Also to be omitted from the diet are foods which are rich in sugar, as sweets, cake, preserves, etc., these things being very prone to undergo fermentative changes especially since the HCl secretion, which acts as a natural antiferment, is secreted in such feeble proportions. Also to be forbidden are all foods which are not easily reduced to a fine pulp by mastication or for any reason cannot be made easily accesible, by fine comminution, to the gastric juice. This includes practically all fried foods and especially fried meats. Under this head would come also the newly made bread, oatmeal and all things which are cooked in fat. This instruction is especially necessary to people who are accustomed to bolt their food insufficiently masticated. The necessity for this precaution is due to the fact that the gastric secretions are so scanty that it is necessary to put every particle of food into the physical shape most accessible to contact with the acid and ferments of the stomach. Masses of food are digested with difficulty even by a normal stomach; food which is saturated with hot oil is also almost impervious to the action of HCl.

With these prohibitions the physician must commence tentatively to formulate a diet which will meet the patient's idiosyncrasies. As a general rule, an account of the tendency to dilatation of the stomach, the meals should be small and frequent, usually five meals a day, that every particle of food may be utilized. If the case is a moderately severe one it is better to commence with food which is in the liquid form, for instance many physicians commence with milk or cream. This may be given with or without raw eggs. Purees of vegetables are nutritious, and pleasant for many individuals. Soups or bouillons may be useful as alternates;



The cereals if thoroughly cooked and finely comminuted are desirable. In the very severe cases, especially those associated with anemia, the use of pure meat juice is exceedingly valuable. Dr. Futterer administers in this way the juice of five pounds of beef each day. The meat is finely chopped round steak mixed with a teaspoonful of salt and placed in a double boiler and covered, the lower part of the boiler is filled with warm water which is kept at about 120°F on the back part of the kitchen stove for about four hours. The juice is then expressed with a potato masher and seasoned to taste.

As the digestive capacity increases more variety may be allowed, such things, for instance, being given as raw or only partially cooked eggs, zwieback, finely minced meat, not overcooked, a gradually increasing variety of cereals, etc. Keep in mind, however, the necessity of giving these patients *enough* food and a diet which has the proper balance, that is, the proper proportion between proteids, carbohydrates and fat. If possible the food should be weighed and enough of it given to assure a value of from 2500 to 4000 calories according to the weight and work of the patient. It is absolutely essential to procure a pure blood supply to restore the debilitated condition to a condition of health.

As regards *drinks*. Very little fluid should be taken at meal time. As a rule tea and coffee are better omitted, though occasionally a half cup of coffee after the meal seems to assist rather than retard digestion. The cereal drinks which are so common nowadays are usually well relished and have the advantage of being nutritious. It is important to bear in mind both as regards foods and drinks that a dilated stomach should be weighed down as little as possible with anything heavy, hence the importance of small and frequent meals and the necessity of abstaining from large draughts of fluid—water, beer or anything else.

Too much emphasis cannot be laid upon the necessity of thorough *mastication*. In no stomach disease is this so important as in chronic gastritis. There can be no question that if all food were chewed to the "disappearing point," as recommended by Horace Fletcher and emphasized by Chittenden, there would be very few cases of chronic gastritis or of other stomach disease; also that thorough mastication would do much to promote their cure.

To secure proper distribution of the blood and stimulate nutrition, personal hygiene is of the utmost importance. The skin should be stimulated, providing the patient is not too debilitated, by a cold sponge bath or spray upon arising, followed by vigorous friction. The body should be kept warm, especially the extremities and the abdomen, and for this purpose silk or wool should be worn next the skin. Exercise in outdoor

air should be insisted upon, such as walking, bicycle riding, horseback riding, rowing, golf, tennis, etc. Where exercises of this kind are not to be had a good substitute should be found in suitable gymnastic exercises, especially those which develop the abdominal muscles. In some cases massage of the abdomen is especially indicated. All these things serve to bring the blood to the surface and the extremities, relieve visceral congestion, help in the elimination of waste, increasing the activity of bowels, kidneys and skin, and give increased tone to the entire body.

*Lavage* is indicated in nearly every case of chronic gastritis and is the most important remedial agent in its treatment. The much abused stomach tube finds its most important therapeutic value in these cases. The frequency of use depends upon the severity of the case. Occasionally it may be essential to wash out the stomach twice or even three times a day but usually once a day is sufficient. Night or morning is the best time, especially if the tube is used only once a day; it should not be used until some hours after eating, or until the digestion is entirely completed. The water should be moderately warm and the addition of a little common salt or bicarbonate of sodium facilitates the removal of the mucus which coats the stomach wall. Various antiseptics may be used through the tube, in solution. Boardman Reed, for instance, uses a weak solution of resorcin or a weak solution of alum, one-half teaspoonful to the quart. Tannic acid may also be employed for its astringent effect (in half the preceding strength) or nitrate of silver may be introduced in solution (1 to 2000) in this way. Other remedies used thus are boric acid, thymol, and salicylic acid. The essential things, however, in the use of the tube are to secure thorough cleansing, the removal of all adherent and irritant mucus, and then putting the organ at rest.

*Hot water* is a favorite remedy in the treatment of chronic gastric catarrh. It should be drunk one or two hours before the expected meal. It may be made slightly saline or alkaline as in the case of the solution used for lavage. It serves to clean the gastric wall and wash the mucus and epithelial waste down into the bowel, while slightly stimulating the mucous membrane. It has, the disadvantage of adding to the danger of infection of the lower bowel. It is, however, a valuable remedial measure, though inferior to the lavage.

In the *medicinal treatment* it is of primal necessity to keep the entire intestinal tract in the best condition possible. Fecal accumulations should be prevented as far as possible by proper hygiene and diet, but in spite of these constipation is likely to be a troublesome symptom. Occasional cleaning out with calomel and podophyllin and other remedies which



stimulate the liver (which is a most important organ in gastric catarrh) are to be directed; these remedies are to be followed by salines. Indeed, in all conditions in which there is a tendency to passive congestion along the digestive tract saline depletion is indicated. For this reason many of these patients receive benefit at the foreign spas where in addition to laxative waters they get the proper diet and hygiene which their cases demand. To maintain regularity of the bowel no remedy will be found more effective than properly graduated doses of the anticonstipation pill (Waugh).

In chronic gastric catarrh lies a special field for the administration of HCl. The dilute acid can be administered in ten to twenty minim doses about an hour after eating. The dose may be repeated in half an hour if indicated. The HCl converts the pepsinogen into pepsin and helps to check the fermentative processes which so readily develop in these cases. Pepsin may be administered though it is rarely needed, the supply usually being sufficient to meet the demands of the stomach unless a large proportion of its secreting surface has been destroyed. In those few cases of atrophic gastric catarrh in which the HCl secretion and pepsin are entirely absent it is now considered better to treat the stomach as part of the intestinal tract and commence at once an alkaline proteolysis by the use of alkalies and pancreatin. In the borderline cases, and for that matter in almost any case of chronic gastric catarrh, the vegetable ferments are of great value, especially the products of the pawpaw, such as papayotin, papoid, caroid, etc. The juice of the pineapple contains a valuable proteolytic ferment and may occasionally be taken with advantage in cases of feeble digestion.

Antiseptic and antifermentative drugs are undoubtedly of great value in cases of gastric catarrh. Boardman Reed speaks well of zinc sulphocarbolate. Personally we have found the combined sulphocarbolates of lime, sodium and zinc better and have secured remarkable results with them in the treatment of these cases. The antiseptic should not be administered until the process of digestion is at its acme, say one to two hours after meals, so that it may not interfere with the evolution of the normal ferments. It should then be given with the object of checking the fermentation and putrefaction both in the stomach and bowels, a fairly odorless stool being the sign of sufficiency.

Silver nitrate is another intestinal antiseptic which has the advantage of acting both as a sedative and a stimulant to the inflamed mucous membrane. It should be invariably given on an empty stomach, usually before meals; the dose is 1-12 to 1-16 grain. Silver oxide may be given in the same doses and is perhaps even superior to the other salt.

As a stimulant to the appetite bitter tonics are usually administered in chronic gastric catarrh. In our opinion the best of these is quassin. The granules should either be allowed to dissolve in the mouth slowly or the remedy should be taken in solution, since its action upon the stomach is a reflex one as a result of the stimulation of the gustatory nerve. Orexine tannate has also been highly recommended for the anorexia. Condurangin also suggests itself as highly applicable in these cases. Hydrastin is one of the best remedies at our command when there is a relaxed and atonic condition of the mucous membrane. Strychnine, especially in the form of the arsenate associated with iron and quinine is a valuable reconstructive tonic and stimulant of appetite. If there is much debility and cellular degeneration nuclein should be added.

For the local effect upon the inflamed mucous membrane bismuth subnitrate is also administered in large doses. It may profitably be given through the stomach tube after lavage; it is floated upon the fluid which is introduced and when the liquid is withdrawn the bismuth remains in contact with the stomach wall. It is sedative and said to be highly useful in cases where there is much mucus and especially in alcoholic gastritis.

Electricity is a valuable remedy in these cases of gastritis, especially intragastric faradization.

Vomiting is often an intractable symptom and may require special treatment. It usually yields promptly to lavage, especially when followed by medicinal treatment. Small doses of calomel with bismuth and ipecac have been found effective by the writer, say 1-6 grain of calomel 1-12 grain of powdered ipecac and five grains of bismuth subnitrate at a dose. When vomiting seems due to a hyperesthetic condition of the stomach carbolic acid in one-half minim doses given in solution, with ten-drop doses of spirit chloroform with a little glycerin to sweeten and peppermint water to make one dram, usually answers nicely. In severe cases minute doses of cocaine, 1-67 grain, repeated every fifteen minutes may be necessary, though cocaine is a dangerous drug and a treacherous one. Menthol sprayed through the tube also acts as a valuable anesthetic to an over-sensitive mucous membrane.

To stimulate the weakened muscles of the stomach and bring about a reaction of the diseased vessels Turck resorts to the use of an inflatable bag attached to the end of his tube into which it is possible to introduce fluids at any temperature desired, or which may be employed for inflation with air, alternately filling and emptying the bag so as to bring about a species of gastric gymnastics. This procedure is undoubtedly effective, at times, in skilled hands.



## GASTRIC ULCER

Ulceration of the stomach is one of the most common causes of "indigestion." In its typical form it is easily recognized, but unfortunately its early symptoms are too often obscure and escape recognition. The absence of pain and hemorrhage should not mislead the physician into an error of diagnosis, since as Boardman Reed points out, "it frequently masquerades in the garb of a more or less severe dyspepsia." Any chronic indigestion should be carefully investigated.

**Etiology:**—The cause of gastric ulcer is not always clear, but it usually occurs probably in the presence of and as a result of an excessive secretion of hydrochloric acid, when the hyperchlorhydria is associated with some general condition which undermines the resisting power of the cells of the gastric mucosa. Probably the most common predisposing cause is chlorosis. It therefore naturally occurs with greatest frequency in young women, early in menstrual life, the greatest number of cases being found between the ages of twenty and thirty. Anemia, syphilis, tuberculosis and other debilitating diseases may act as predisposing causes. The ingestion of articles of diet which are mechanically irritant or excite the secretion of an excess of HCl favors the incidence of the disease. Pressure from without, as occurs with tailors and shoemakers, may also exert some influence in producing the disease.

**Morbid Anatomy:**—The ulcer is due to digestion of a portion of the stomach wall. Just why this occurs in this condition and why the stomach does not at other times digest itself has long puzzled physiologists. Probably in this condition a small area of mucosa, corresponding with the distribution of an arterial twig, is either dead or in a very low state of nutrition, either from general or local causes. Virchow suggests that thrombosis or infarction of the nutrient blood-vessels favors digestion of the mucosa. Anemia certainly seems to be an essential factor in the etiology of the disease.

The ulcer is usually located on the posterior wall or lesser curvature, not far from the pylorus, which is not infrequently involved. The anterior wall, fundus and greater curvature are rarely attacked. The ulcer is usually single, round or oval in shape, with well-defined and clear cut edges, though rarely it may have serrated borders. It is funnel shaped and may penetrate all the layers, even the peritoneal, but its floor is usually the muscular coat. In size it is usually small, one-half an inch or less in diameter, but rarely the diameter may reach several inches; these large ulcers are usually the result of the coalescence of several small ulcers. An ulcer may perforate the walls of a vessel and cause hemorrhage, the

amount of blood lost depending upon the size and importance of the vessel. When spontaneous cures take place, as not infrequently happens, scar tissue is formed; these cicatrices are frequently found in persons who have died from other causes and in whom a serious disease of the stomach was unsuspected. If the ulcer penetrates the peritoneal coat an opening may be made into the peritoneal cavity, the bowel, the pleural cavity, or even externally; or the cicatrix which it leaves behind may cause stenosis of one of its orifices, usually the pylorus.

**Symptoms:**—The most characteristic symptoms of ulcer are: (1) Pain, which has a distinct relation to the taking of food; (2) localized tenderness; (3) gastric hemorrhage, blood appearing in the vomit or stool; (4) an excessive secretion of hydrochloric acid.

If there is associated with the symptoms more or less marked anemia or other evidence of malnutrition the diagnosis of ulcer may safely be made. And yet, as already pointed out, the absence of these symptoms will not warrant us in positively excluding it.

The most constant and characteristic symptom of ulcer of the stomach is *pain*. This comes on soon after eating, usually within half an hour, and is intensified by taking food; it usually disappears when the stomach is empty. It is burning or boring in character, diminished by rest and certain postures, localized to a circumscribed area in the epigastrium which the patient will learn, and often passes through the body, felt between the shoulder blades or along the spine, especially on the left side, or radiated in various directions. Liquid food causes less pain than solid food.

The *tenderness* is usually confined to a rather small area in the epigastrium seldom much larger than a silver dollar, located either in the middle line or a little to the left, and an inch or two below the xiphoid. This location, however, varies considerably and is of course dependent upon the seat of the ulcer. A similar tender point is usually to be found in the back, near the junction of the lower two or three ribs of the left side and the spine.

*Hemorrhage* is a common and important symptom. If its source is arterial and the quantity is considerable the patient vomits up bright red blood; if it comes out more slowly from an eroded vessel, the blood is partially digested and ejected as the so-called "coffee-ground" vomit. If the quantity is small and vomiting does not occur the blood passes into the bowels and gives a peculiar tarry consistency and appearance to the stools. If the ulcer occupies a non-vascular location there may be such slight capillary oozing that blood does not appear, either in vomit or stools, in microscopic quantities.



*An excessive secretion of hydrochloric acid* occurs, according to Hemmeter, in 88 per cent of the cases. It is a very constant symptom and its recognition of much diagnostic value. Organic acids are absent. The use of the stomach tube is to be avoided, especially if hemorrhage is recent or a deep ulcer is at all suspected.

*Vomiting* is a very common though not a constant symptom. It usually occurs at the height of digestion and is followed by a cessation of the pain. The vomitus consists of partially digested food, highly acid and frequently containing blood.

**Diagnosis:**—In well defined cases it is usually easy, but in many it presents considerable difficulty. The characteristic symptoms are (1) hydrochloric acid excess; (2) severe pain in the stomach coming on soon after eating and associated with local tenderness; (3) hemorrhage from the stomach, with or without tarry stools. It is in cases in which one or more of these symptoms are absent that confusion arises as to the diagnosis.

An excess of hydrochloric acid occurs in the neurosis, Hyperchlorhydria. This symptom is, however, seldom constant in the latter cases, and varies greatly in its intensity. In hyperchlorhydria also the pain is relieved by taking food, while in ulcer this intensifies it.

Hemorrhage is also a symptom of cancer of the stomach; but in the latter disease there is associated cachexia and the vomit shows the blood in a more decomposed and darker condition. In cancer, HCl is usually absent, and there is an excess of lactic acid.

In chronic gastritis there is usually a reduction in the quantity of HCl, though in the form known as acid gastritis it may occur in excess; blood is absent or at the most slight tinges may appear; mucus and epithelial fragments are found; pain is not present, except as a sense of discomfort.

In gastralgia the paroxysms have no relation to the taking of food.

Hepatic colic also presents paroxysms of pain, but not connected with eating. There is no hemorrhage. Jaundice usually follows the attack and an examination of the stool shows the presence of one or more gallstones.

**Prognosis:**—This is always a serious disease and every case in which it is suspected should have the most painstaking examination in order to establish the diagnosis. Perforation of the ulcer may cause peritonitis, pleurisy, pneumonia, etc. If the ulcer erodes a large vessel a dangerous and possibly fatal hemorrhage will result. It is now a well established fact that the seat of an ulcer or the cicatrix following it may be the point of localization for a carcinomatous growth.

**Treatment:**—In the treatment of gastric ulcer it is essential that the stomach should be placed as nearly at rest as possible. The patient should therefore be put to bed and absolute quiet insisted upon. In order to secure the maximum of rest for the stomach, feeding for the first week after treatment is commenced should be entirely by the rectum; occasionally stomach feeding will answer in very mild cases, alkalized milk, malted milk, or beef juice being the main foods. The food should be administered by an enema every four to six hours in quantities of four to six ounces at each feeding. Before administering the food, the rectum should first be carefully emptied by enema and irrigated with a normal salt solution.

Various food preparations can be administered by this route, such as peptonized milk, peptonized gruel, beef juice, bovine milk, raw eggs, somatose dissolved in milk or water, etc. To every enema a little salt should be added to facilitate absorption and if the bowel is at all irritable the addition of a few drops of tincture of opium, or better still, of about a quarter a grain of morphine in solution, is desirable.

After a week or ten days, if the patient shows improvement, feeding by the mouth should be gradually resumed. First, commence with a little milk diluted with lime water or vichy, egg albumin water, liquid peptonoids or malted milk. If milk is given it is well to have it peptonized at the start.

The amount of food is to be gradually increased as the tolerance of the stomach improves. If any evidence of irritation arises in the stomach the food given by the mouth may be temporarily stopped, or at least the quantity of food given by this route diminished, and rectum feeding resumed. Following this course the amount of food by the stomach is gradually increased while that by the rectum is gradually diminished until the food is all taken by the natural route.

The patient should be kept in bed during all this time and it may be necessary to keep him there for weeks and months.

As regards medication; sodium bicarbonate may be administered to counteract the excessive flow of hydrochloric acid. The patient may be directed to drink some alkaline mineral water, especially those which are laxative, since constipation is often a troublesome symptom in some of these cases.

To check the flow of hydrochloric acid and to relieve the spasmodic and painful condition of the stomach, the indicated drug is atropine. It may be given to slight physiological effect for a long period of time. Nitrate of silver, given in pill form, in doses of one-fourth to one-half grain is a favorite remedy for its direct local effect upon the stomach.



Fleiner's method of treating these cases was by the injection of large doses of bismuth subnitrate; after washing out the stomach with a tube, two and one-half drams suspended in water are introduced into the viscus and the water gradually withdrawn. This brings the bismuth in direct contact with the walls of the organ, thereby reducing local irritability and facilitating the healing of the ulcer.

Hemmeter introduces the bismuth through a powder blower. The disadvantage of this mode of treatment is that in many cases the introduction of the tube is dangerous, especially if the ulcer has penetrated the more superficial layers and now has reached the deeper muscular or possibly the peritoneal coats. In such cases there is danger of puncture, which may be directly induced by the use of the stomach tube.

In cases of hemorrhage, the patient should be kept on his back, absolutely still, not being allowed to move hand or foot. Neither food nor drink, with the possible exception of a little ice, is allowed. An ice-bag should be placed over the pit of the stomach and perfect quiet secured by a hypodermic of morphine. If the hemorrhage is associated with considerable shock the circulation may be equalized by repeated doses of glonoin, atropine, and strychnine. Perforation should be treated the same as shock.

### CANCER OF THE STOMACH

Next to the uterus the stomach is the most frequent site of cancer. The investigations of Welch showed that 21.4 per cent of 30,000 cases which he investigated were located here. It occurs rather more frequently in males than in females, in the proportion of about 5 to 4. Gastric carcinoma is a disease of advanced middle life, about 58 per cent occurring between 40 and 60; nevertheless it occurs at all ages.

**Etiology:**—Previous stomach trouble seems to play a slight part in its causation; in 150 cases admitted to the John Hopkins Hospital Osler found a history of indigestion in but 33. It is, however, considered highly probable that many cases of stomach cancer owe their existence to a previous ulcer, being implanted upon scar tissue. Once in a while there seems to be a history of injury, and indulgence in alcohol may occasionally predispose to its incidence. But in the majority of cases the disease is primary but occasionally it is secondary to carcinomatous infections elsewhere, especially of the breast.

**Pathology:**—The growth originates in the glandular elements of the mucosa, from which it has a tendency to spread to the submucosa and muscular layers of the stomach, with metastatic infection through

the lymphatics of other portions of the body. There are four common varieties of cancer of the stomach, occurring in about the following order: (1) Adenocarcinoma, a nodular cancerous growth in which the glandular element is prominent, the tissue presenting a large amount of tubular structure, lined with cylindrical epithelium. There is white cell infiltration of the stroma, which is abundant. (2) Medullary carcinoma. The cancerous growth is large, rapidly involving large areas in the stomach wall, consists of soft cauliflower-like masses which break down easily and bleed. The connective tissue stroma is rather scanty and the cellular element prominent. There are irregular alveolar spaces, lined with cells which are polyhedral or cylindrical. (3) Scirrhous. In this form the cancer is hard and resistant, consisting most largely of connective tissue. There is a predilection for the pylorus. (4) Colloid. These cancerous growths belong to the type of the medullary growths, containing large alveolar spaces which become filled with gelatinous matter. They grow rapidly and involve large areas.

The seat of involvement in cancer of the stomach is most frequently the pylorus; according to Brinton this portion of the stomach was attacked in 60 per cent of his 360 cases. In 10 per cent the cardia was attacked, the remaining 30 per cent being distributed over various areas. The fundus rarely suffers. If the pylorus is the seat of the disease the stomach is usually dilated; if the cardia, it may be considerably contracted. The softer forms of cancer, the medullary and colloid, show the most rapid growth. Metastatic growths soon form in the neighboring glands, liver, gall-bladder, peritoneum, omentum, etc. Not infrequently these growths may be found subcutaneously in the epigastric region or around the navel, in which cases they are a valuable diagnostic sign.

**Symptoms:**—The first symptoms are those of indigestion, and are more or less obscure. As the disease progresses there is emaciation, loss of strength and anemia. These symptoms may make their appearance very gradually or very rapidly, according to the type of the cancer and the rapidity of its growth. There is usually loss of appetite, a dry coated tongue, nausea and a gradually increasing sense of discomfort, growing in severity until it becomes an actual pain, dragging, gnawing or burning in character.

Vomiting may be absent and is a fairly constant symptom, especially late in the disease, when there is obstruction of the pylorus. It usually does not occur immediately after eating, but the ejected matter usually shows that the food is not being well digested.



Hemorrhage occurred in 36 out of 150 cases reported by Osler, the vomited matter usually being dark or "coffee ground" in character—rarely bright red. Careful examination of the vomitus usually reveals the presence of blood.

Anemia is quite constant. The number of red blood cells may be reduced a half while the percentage of hemoglobin is often below 50. There is leucocytosis. After the development of anemia there is likely to be some ascites around the ankles in the later stages of the disease and, rarely, anasarca. The skin takes on a peculiar lemon-colored tint which is quite characteristic.

Pain, as already said, is a very common symptom and occurs relatively early; it may be referred to the pit of the stomach, or to the back or shoulder blades. It is constant but is generally aggravated by taking food.

Fever usually occurs sometime during the disease but is not a constant symptom; the elevation of temperature is rarely high.

Constipation is the rule and blood may usually be found in the stools. The urine often shows no changes, but sometimes there are albumin and casts; occasionally indican; and more rarely glucose, acetone and peptone.

Upon physical examination a tumor may be detected in a large percentage of cases; but where the growth is at the cardia or on the posterior wall of the stomach it is often impossible to palpate it. The tumor when felt is usually easily movable, changes its position with respiration and peristalsis and with the pulsations of the abdominal aorta.

Examination of the stomach contents is of great value in the diagnosis of cancer of the stomach. In the majority of cases HCl is entirely absent—it used to be thought invariably so, but this has been shown not to be the case. Probably where the cancer has been implanted upon gastric ulcer the HCl secretion is more likely to persist. After the Boas meal of oatmeal gruel if there be cancer lactic acid will usually be found. This is a valuable sign of this disease. The Oppler-Boas bacillus is also found in the stomach contents; this is thought to be the cause of the formation of the lactic acid. Yeast is also present but sarcinae are rare. The stomach washings will also reveal in many instances fragments of the growth, blood, etc. which aid in the diagnosis.

**Diagnosis:**—During the early stages the diagnosis is very difficult and may be impossible. Where there is persistent indigestion in a person of middle age, with more or less constant pain in the stomach or associated areas, *with anemia and emaciation*, the physician should be

very suspicious. Gastritis is a very chronic disease and as a rule the blood changes and anemia are not so pronounced; it should be remembered however that in some forms of gastritis there is a distinct tendency to anemia of the pernicious type, and in these cases the nutritional changes are very marked. Ulcer of the stomach has within recent years been the source of a great deal of confusion; many cases that have been diagnosed as gastric ulcer after examination of the stomach contents, have turned out to be carcinoma. As a rule, however, ulcer occurs in younger patients and the presence of HCl in excess and the absence of lactic acid clears up any doubts as to the nature of the trouble. The grave anemias often present a clinical picture that may be taken for cancer, especially where there is associated indigestion, as is not infrequent. In pernicious anemia the number of blood cells is much less than in cancer—may fall below the million. Stomach contents should be examined.

**Prognosis:**—Cancer of the stomach is of course a fatal disease. The patient usually dies within a year or eighteen months.

**Treatment:**—Mainly palliative, addressed to the maintenance of nutrition and the alleviation of pain. Often the rapid emaciation may be temporarily checked by careful attention to the diet, the use of concentrated and easily digestible—possibly predigested—food, washing out the stomach, attention to the bowels, etc.

A remedy which has been recommended for cancer (and in some cases this remedy has certainly produced remarkable results) is conduragin. While this is not claimed to be a "cure" for cancer it deserves a more thorough trial. It certainly relieves the pain and in a large percentage of cases favors nutrition.

Observations on hundreds of cases have shown that in almost every case this remedy exerted a decidedly beneficial action, and a considerable number were discharged apparently cured. Autopsies held on several who died from other maladies are said to have confirmed the diagnoses. A remarkable observation was that the benefit was only manifested on cancers of the stomach, while similar maladies of the liver and pancreas were not benefited. This seems to indicate that the action is a purely local one. Nevertheless we have been unable to find any evidence showing that any investigator has applied condurango locally. This plant depends for its activity upon a glucoside, conduragin. This has been isolated and may be employed hypodermatically. It seems that there is a legitimate field for experiment with it in inoperable carcinomas.

For gastric cancer the glucoside may be given in doses of gr. 1-67, three times a day, in a little hot water, when the stomach is empty, and



this may be gradually increased to the limit of toleration, and continued as long as the need demands.

### HEMATEMESIS

Vomited blood may be derived from the throat, esophagus, stomach or perhaps the duodenum. The hemorrhage may be from injury to these parts; disease such as carcinoma, ulcer, aneurism, or acute hyperemia; portal stasis; vicarious menstruation; affections of the blood tending to cause hemorrhage, such as scurvy and hemophilia; and disease of neighboring parts that perforates the cavities mentioned. The diagnosis of hematemesis depends on the condition of the blood, which is usually clotted or disintegrated by the gastric secretions as in the black vomit of yellow fever. It is acid and contains food elements. Nausea attends the hemorrhage. The diagnosis of the causal disease is to be made by a study of the preceding and accompanying symptoms. Blood from a bursting aneurism or an eroded artery may be bright and fluid. Malingerers who vomit dark fluids may be detected by examining the vomitus with the microscope, and by the absence of concomitant symptoms. The prognosis depends on the cause.

The best treatment for any internal hemorrhage consists in the use of atropine, gr. 1-134 every half to one hour till the blood reddens the skin. The blood crasis may be improved by giving lime salts, the lactophosphate, in doses of grs. 10 daily, divided, for months.

### GASTRIC NEUROSES

**Definition:**—Under the term, gastric neuroses, are included the various ailments of the stomach caused by disturbance of the innervation of this viscus and in which there is no demonstrable pathologic lesion of the organ itself.

The term, *nervous dyspepsia*, was formerly much employed to designate various mixed gastric neuroses, and it is still used by some authors to describe a symptom-complex which differs greatly in different cases, but in which the local and general sensations which commonly follow a full meal are exaggerated in intensity and accompanied by alterations of taste and appetite, eructations, pyrosis, nausea, headache, vertigo and diffuse tenderness—the digestion meanwhile taking its normal course and being completed in its normal time.

**Etiology:**—Neurasthenic and hysteric conditions are the most common predisposing causes. Ailments of this class are most frequently

seen in women; they may be the result of mental overwork, physical exhaustion, nervous strains or psychic shocks, sexual excesses, alcoholic indulgence, improper food or overeating, gulping the food, insufficient exercise, etc. In many cases the trouble is reflex; thus gall-bladder disease, disease of the pelvic organs in females, pregnancy, autotoxemic states, nephritis, central nervous disease (locomotor ataxia), etc., may act as causes of stomach trouble.

It is important to bear in mind that these neuroses are *not* to be considered as separate diseases. It is rare indeed that one neurosis exists alone. Clinically we have to deal for the most part with combined neuroses.

## NEUROSES OF MOTION

### I. IRRITATIVE STATES

**Varieties:**—(a) Gastropasm and peristaltic unrest; (b) cardiospasm; (c) pylorospasm; (d) nervous eructation and vomiting.

**Gastropasm and Peristaltic Unrest:**—It is doubtful if neuroses of this type are ever primary. In the vast majority of cases the increase of motility is due to direct irritation of the mucosa by an excessive secretion of hydrochloric acid, or to the presence of fermenting foods or gases, the result of indigestion. Pyloric stenosis, by preventing rapid emptying of the stomach may act as a cause of gastric spasm or muscular overaction. Nervous erethism is a predisposing cause.

The simplest expression of increased stomach motility is rapid emptying of the stomach. In gastropasm the whole stomach is firmly contracted; it is very uncommon.

Peristaltic unrest consists in rhythmic contractions of the muscles of the stomach, running from the fundus toward the pylorus. If the abdominal wall is thin they are readily felt, and sometimes may be seen. The patient is conscious of this movement, which causes discomfort, rumbling in the stomach, etc. It is often associated with pyloric stenosis or some displacement of the stomach.

**Cardiospasm:**—In most cases this is due to hyperesthesia of the gastric mucosa, irritated by overproduction of HCl or other mechanical or chemical irritants. It may be provoked by swallowing of air or the presence of gases, which set up muscular spasm. Inflation of the stomach may follow, known as pneumatosis. Passage of the stomach tube may cause spasm of the cardia and prevent its introduction.

Structural conditions which may cause cardiac spasm are ulcer or erosion at or near the cardiac orifice, and cancer.



Gas in the stomach may cause painful distention, difficulty of breathing, cardiac oppression, feeble pulse and headache. When the gas is passed the symptoms disappear. If the spasm persists a serious symptom is the difficulty of swallowing. Food may accumulate sometimes in an esophageal cul-de-sac. A diagnostic point of some value is, that a large stomach-tube is passed much easier than a smaller one; the opposite is true in stricture at this point.

**Pylorospasm:**—The same causes as of cardiospasm. It may be induced by local irritants—hydrochloric acid in excess, hot or irritant foods, or the products of fermentation. Irritability of the nerves predisposes. Cancer, erosion or ulcer at or near the pylorus may cause spasm.

Pyloric spasm occurring during digestion seriously interferes with emptying the stomach; there is food stagnation, maybe fermentation. Retention of food in the stomach may be detected by the stomach tube, by Ewald's salol test or Fleischer's iodine test. Prolonged spasm may result in organic stricture, gastric dilatation or gastropsis. In associated cardiac and pyloric spasm gaseous distention is likely to be pronounced.

**Nervous Eructation and Vomiting:**—Neurasthenic and hysterical conditions are the underlying factors in a large percentage of these cases. Eructation is often the result of air swallowing, especially in hysterics, though in many cases it is due to the gases of fermentation and then may be the result of any atonic form of indigestion, functional or organic. Nervous vomiting is frequently the symptom of disease remote from the stomach; it is characteristic of some diseases of the brain and its meninges, the spinal cord (locomotor ataxia), kidneys, liver, genital organs, and pregnancy. Psychic factors are particularly in evidence here; vomiting may be excited by disgusting sights, offensive odors and accompanying faintness.

Nervous eructations are characterized by the expulsion of odorless and tasteless gas. It may occur remote from meals. It may be associated with spasms of the cardia or pylorus, and pneumatosis may complicate it. If there is regurgitation of acid contents this is called pyrosis or waterbrash.

Nervous vomiting, though it usually follows meals, may occur at any time, or when the stomach is apparently empty. The appetite may be excellent and the character of the food or its quantity matters of indifference. Vomiting often comes without prodromal nausea and may be periodic.

**Treatment of Irritative Motor Neuroses:**—Neurasthenia demands an abundance of rest, the treatment being modified to meet the demands of the case; hysterics are very susceptible to suggestion, and this should

be made free use of. Appropriate remedies to raise the tone of the patient and improve nutrition, such as strychnine, the arsenates and nuclein, may be indicated.

The food should be easily digested and absolutely free from irritation, therefore excluding condiments, pastries, sweets and other substances which tend to undergo fermentative changes. Commence with a milk diet, which may be gradually enlarged. In spasmodic affections of the pylorus it is better to give frequent meals and small ones because of the tendency to retention, stagnation and subsequent dilatation.

Gas may be removed by the stomach tube; if this is passed with difficulty, relief may be obtained by introducing a spray of menthol or cocaine through the tube to the point of spasm. Use a large tube. Galvanism is highly recommended. The Winternitz cold pack to the stomach is highly recommended in all the painful gastric neuroses.

The medicinal indication is for antispasmodics and the best of these is hyoscyamine. This may be given in small repeated doses until relief is secured, and if there is accompanying vascular disequilibrium, as shown by pallor of the skin and cold extremities, it will be well to give glonoin to effect, maintaining the effect by the subsequent use of hyoscyamine. Strychnine in small doses will maintain the necessary vascular tension and nerve support. Hemmeter and others use the bromides in these cases, and the valerianates are also useful; the valerianate of strychnine is suggested.

In cases associated with pain the gastric sedative combination of resorcin gr. 1-40, cocaine muriate gr. 1-100, atropine sulph. gr. 1-2500, delphinine gr. 1-1000, should be employed. This combination may be given every ten or fifteen minutes until relief is obtained.

If there is gastric fermentation resort should be had to the sulphocarbolates; frequently these may be combined with the subnitrate of bismuth to good advantage. This will not control purely nervous eructations, which demand psychic treatment of a vigorous character.

If vomiting is troublesome the gastric sedative mixture above referred to will often be found effective. Oxalate of cerium is another good remedy, while small, frequently repeated doses of calomel should be given if there is associated intestinal sluggishness. A combination of cerium oxalate, bismuth subnitrate and calomel is good. Minute doses of phenol given in peppermint or chloroform water often check nervous vomiting. Where vomiting is so severe as to interfere seriously with nutrition it may be necessary to resort to rectal feeding.



## II. IN DEPRESSIVE STATES

**Insufficiency of the Cardia:**—Neurotic and psychic states dispose to this condition. Here there is a paretic condition of the nerves supplied to muscles of the cardia. Whooping-cough is a frequent cause.

The usual form is regurgitation of food. This may occur at any stage of digestion.

A peculiar form is *rumination* or *merycism*, when food which comes up is rechewed and swallowed again. The patient experiences a peculiar satisfaction in this practice.

**Pyloric Insufficiency:**—The general causes are defects in innervation, in rare cases ulceration and carcinoma.

The food passes rapidly through the stomach and is unloaded into the duodenum before stomach digestion is complete. So long as the intestine and associated glands are able to do the additional work, there are no symptoms, but sooner or later, intestinal indigestion results. Pyloric insufficiency may be detected by inflating the stomach with gas; if the gas remains in the stomach and is not eructed the valve is intact, while if it disappears the inference is that it has passed over into the intestine.

**Gastric Atony:**—May result from some nervous disorder, following acute or chronic disease which causes adynamia, or as a primary neurosis. Overloading the stomach, especially with fluids, causes muscular weakness and atonia; it is rather common in beer-drinkers. Ulcerative, spasmodic or stenotic conditions of the pylorus or obstructive disease of the intestinal canal, may cause it.

After eating there is a sense of fullness and oppression in the stomach, which persists till it begins to empty. There is temporary dilatation, which may become permanent. In mild cases the discomfort lasts only for an hour or so; in the advanced it may persist from one meal to another. Accompanying symptoms are headache, eructations of gas, possibly vomiting, and constipation. Fermentation is a result of food retention, and is likely to result in troublesome gas formation.

A common, though not very reliable, method of testing gastric motility is by the salol test; this consists in administering a gram of salol by the mouth; not being readily absorbed by the gastric mucosa it does not appear in the urine until after it has reached the intestinal canal. Normally it appears in the urine as salicyluric acid within 45 minutes to one hour after ingestion.

A simpler and more reliable method is the administration of water on an empty stomach, noting by percussion the descent of its lower border with increasing quantities of the fluid. Or by succussion the splashing of retained fluids may be detected, aided by the stethoscope placed over the epigastric region. Inflation with gas also serves to outline the size and distensibility of the organ. Other methods of determining this are by the use of Einhorn's gastrodiaaphane, or by the x-ray, the walls of the stomach having been made opaque by the administration of bismuth subnitrate.

**The Treatment of Depressive States:**—Neurasthenics and hysterics should receive appropriate treatment. Diet should be adjusted to the condition of the secretions. In many cases the HCl is diminished but not always. Very bulky food and large quantities of fluid must be avoided. The food should be concentrated, very nutritious and not inclined to fermentation; sweets and wines forbidden. A slightly stimulating diet, unless contraindicated may be prescribed.

Massage, faradization, the cold shower and sponge baths to arouse reaction, may be advisable.

Benefit is derived from bitter tonics. Strychnine, quassin, capsin and similar remedies will be found effective in appropriate cases, with berberine to contract the relaxed connective and juglandin to control the tendency to constipation and stimulate the protective forces of the liver. If there is defective secretion of HCl this should be administered, one-half to one hour after meals, the bitter tonic being taken either with the food or directly before eating. Pepsin or other digestants are not required.

## SENSORY NEUROSES

**Hyperesthesia:**—This is most common in nervous women, "run down" and irritable from overwork, nervous or psychic strain. Hyperchlorhydria and errors of diet which produce it are exciting causes.

Unpleasant sensations in the stomach are felt, fullness, burning, pain and throbbing (consciousness of aortic pulsation, especially in thin persons). These follow the ingestion of food and disappear at the end of gastric digestion. There are often headache, neuralgia, etc., sometimes vomiting, peculiarly erratic appetites, for things apparently indigestible which are eaten without discomfort. Urticarias following strawberries, shellfish, etc., are often the result of gastric hyperesthesia.

Treatment should be addressed mainly to the underlying cause. Hyperchlorhydria should be treated along the lines hereafter described.



A hot water bag on the stomach during digestion often relieves distress. Sedatives are indicated as described for the Irritative Motor Neuroses. The "gastric sedative" combination is especially to be commended; while strychnine valerianate is the proper remedy to "take up the slack".

**Gastralgia; Gastrodynia; Neuralgia of the Stomach:**—This common and very painful neurosis is prone to appear in women, with menstrual disorders or at the menopause. Weakness, malaria, syphilis, anemia, hemorrhage or anything which undermines the strength may act as a predisposing cause; while exciting causes are nervous or mental strain, physical exhaustion and various gastric disturbances, but especially hyperchlorhydria. The gastric crises of locomotor ataxia are closely allied. There seems to be no direct association between taking food and the attacks; they may come immediately after eating or when the stomach is empty.

While there may be prodromal symptoms, headache, gastric discomfort or depression, in most cases the attacks come without warning. The pain is agonizing, extending through to the back, relieved by firm pressure upon the pit of the stomach or by hot drinks. The skin is bathed in cold, clammy sweat, the extremities are cold and clammy, the pulse rapid and feeble. The attack may last a few minutes, an hour, or more, and terminates with vomiting, the eructation of gas, or the passage of a large amount of nearly colorless urine. These attacks show a decided tendency to recur.

Very often gallstone colic is mistaken for gastralgia, or one for the other. In both the pain is very severe and paroxysmal in type, but in gastralgia the pain is relieved by pressure and runs through to the back, while in biliary colic it is unrelieved by pressure, is seated more to the right and tends to run up into the shoulder blade; biliary colic is also usually followed by jaundice and the stone may be found in the stools.

In gastric ulcer and carcinoma there is pain of an entirely different character, intimately associated with the process of digestion and easily diagnosed.

In intestinal colic there is usually a history of ingestion of improper food; the pain is diffuse but centering around the umbilicus and there is a tense and tympanitic abdomen; pain is relieved somewhat by passage of gas.

Gastralgia is seldom if ever fatal.

**Treatment:**—Undigested food in the stomach or bowels should be removed. An enema will unload the lower bowel and the stomach tube may be brought into requisition if that viscus seems distended.

Usually a number of small repeated doses of calomel, followed by a saline laxative, will prove sufficient. The sulphocarbolates should then be given to check any fermentative or putrefactive process, and put the canal in a thoroughly innocuous condition. A teaspoonful of sodium bicarbonate or 40 drops of chloroform, in a glass of water, will quickly relieve.

In mild cases pain will often be relieved by local applications of mustard, turpentine stupes, hot fomentations or the hot water bag. Severe cases may require resort to morphine hypodermically, but usually atropine alone will give relief. A granule of glonoin gr. 1-250, and one each of hyoscyamine gr. 1-250, and strychnine valerianate gr. 1-134, administered in hot peppermint water every fifteen minutes, will usually give prompt relief. The zinc and codeine tablet (containing zinc sulphocarbolate gr. 1, codeine sulphate gr. 1-8, hyoscyamine amor. gr. 1-500 and strychnine sulphate gr. 1-134) is an excellent preparation in these cases, the sulphocarbolate serving to check any tendency to fermentation. Good diffusible stimulants are aromatic spirit of ammonia, Hoffman's anodyne, and Jamaica ginger; these serve as household remedies and are often sufficient. Here, as in many other conditions, relief is usually obtained by arresting the vascular spasm and bringing the blood to the surface; hence the value of the combination of glonoin, hyoscyamine and strychnine.

The subsequent treatment depends entirely upon the cause. Generally speaking it should be reconstructive and corrective of any gastric or other associated trouble.

**Anorexia; Loss of Appetite:**—Loss of appetite occurs as a prodrome and a symptom of most acute diseases; also in many chronic ailments. Constipation, biliousness and other forms of intestinal autotoxemia, are often marked by poor appetite. As a pure neurosis it occurs, but not often, usually during neurasthenia or hysteria. Hemmeter notes that in these cases there is usually a reduction of HCl.

Treatment must be directed to the underlying condition. The bitter tonics are most effective, taken in solution so as to act directly upon the gustatory nerve terminals. Quassin is generally satisfactory. Orexin has been shown to be effective.

Appetite as a factor in digestion is not half appreciated. The studies of Pawlow have shown that digestion is dependent very largely upon psychic causes, much more perhaps than upon the direct stimulation of the gastric mucosa by the presence of food. In a normal person the odor of an appetizing meal or the appearance of a well garnished dish excites the flow not only of saliva but of the gastric secretions as well. If appetite



is in abeyance the digestion must suffer. Where appetite and digestion are feeble, prepare the food in the most appetizing way possible.

**Hyperorexia; Bulimia; Excessive Appetite:**—Excessive appetite is one of the characteristic symptoms of diabetes mellitus. It occurs occasionally as a neurosis. Appetite is however "very various"; the growing boy or the healthy farm hand may be expected to take more interest in his food than a seamstress working in a city tenement. Allow for such differences. True hyperorexia may come soon after eating, and if food is not taken there may be headache, pallor, or cardiac palpitation. When no satiety follows eating the condition is called acoria.

## SECRETORY NEUROSES

### HYPERCHLORHYDRIA; HYPERACIDITY

There are only two conditions in which there is an increase in the quantity of HCl secreted by the stomach. The first we are now describing; the second is ulcer of the stomach. It may occur occasionally in other affections, as tabes and migraine, and in "acid gastritis," but not constantly. Unlike nearly all other neuroses it is more common in men than in women. It occurs much in the better classes of society—among brain workers—but it may occur in any class. It is very frequently described by the laity under the very comprehensive term of "heartburn." A rich proteid diet, with abundance of condiments and alcoholic or other stimulating drinks predisposes to it.

The normal quantity of hydrochloric acid varies greatly in different individuals. Among the Japanese and other races which live largely upon cereals, with little meats, the secretion of HCl is much smaller than among meat-eating nations. In this country the average is probably about 0.15 per cent. But some persons will secrete twice this percentage and suffer no discomfort. Furthermore, much depends upon the irritability of the individual stomach—as well as of the individual himself. In hyperchlorhydria the percentage is increased to twice or even four times the normal quantity. Americans are said to be a "nation of dyspeptics," and this is the form of dyspepsia from which most of them suffer; it is estimated that at least 25 per cent of the digestive ailments fall under this head. The gulping down of half masticated food, mixed with a heterogeneous mess of condiments, sauces, pastries and drinks, hot and cold, is peculiarly an American vice and plays the exciting part.

This is not "poor digestion." Until some permanent change takes place in the stomach as a consequence of being bathed at frequent intervals in a highly irritating fluid, the digestion is good—abnormally good.

There is a slight shortening of the period of starch digestion in the stomach, but otherwise the work is well done, and proteid is disposed of with great rapidity.

The symptoms are referable to the irritation produced by the excess of HCl. The leading symptom is *pain*, which varies greatly in intensity, but is usually burning or gnawing, and gives a sensation of rawness in the epigastrium. There is usually tenderness over the stomach, diffuse, not well localized. The pain presents the following characteristics:

1. It appears one to three hours after the meal, is most intense during the height of digestion and usually ceases when the stomach is emptied.
2. It is relieved by taking alkalies or proteid food, as milk, meat or egg.

There are other symptoms of varying importance, which depend upon the degree of hyperesthesia of the mucosa. Thus, vomiting occurred in one-third of Hewes' cases; eructation of gas (usually odorless and tasteless) and regurgitation of acid fluid, consisting of the nearly digested meal, are common.

In an irritable stomach the acid may set up spasmodic conditions at either orifice, or more rarely of the entire organ; these add greatly to the distress, and if there is considerable spasm of the pylorus the food is not readily expelled into the duodenum, while as a result of the prolonged contact the mucosa becomes irritated and finally inflamed, the organ dilated and its musculature at last atonic. In other words we are dealing with a mixed neurosis of secretion, motion and sensation, one which is very likely to terminate in gastric catarrh with dilatation.

Constipation is a very constant symptom, due to pouring the very acid chyme into the duodenum and consequent prolongation of intestinal digestion.

A test meal should be given and the contents withdrawn and examined. The Ewald-Boas consists of a dry roll or wheat bread (two ounces) and two cups of tea (unsweetened) or water. At the end of an hour the contents of the stomach is withdrawn and examined. The following test may be used to determine the amount of free hydrochloric acid:

*Dimethylamidoazobenzol test (Töpfer's test):*—Two or three drops of a 0.5 per cent alcoholic solution of this drug are added to the filtered solution withdrawn from the stomach, of which exactly 10 Cc has been taken. This turns the solution a bright red. Now we add, drop by drop, decinormal NaOH solution, shaking frequently. When the acid is completely neutralized the red fades out. To compute the percentage multiply the number of Cc. of the NaOH solution required to neutralize the acid by 0.00365, the quantity, expressed in grams, of HCl in the acid



solution. This test is sufficiently accurate for all practical purposes. For phenolphthalein test for total acidity see elsewhere.

Closely allied to hyperchlorhydria is *gastrosuccorhea* (*gastroxynsis*). In this condition there are recurring attacks of hypersecretion. These come when the stomach is empty, often at night, severe pain, nausea and vomiting of large quantities of acid gastric juice, which may be mixed with bile and contain mucus. There is intense thirst. There are the usual symptoms of shock—headache, pallor, cold skin and extremities, etc. The health in the intervals is usually good.

*Reichmann's disease* (*Gastrosuccorhea continua chronica*) is another disease in which there is excessive HCl secretion, a form of hyperchlorhydria. Here the stomach continues to secrete without intermission, even when fasting. Acid vomiting is frequent.

**Diagnosis:**—Hyperchlorhydria is most likely to be confounded with gastric ulcer. In both there is an excessive secretion of HCl and it is highly probable that ulcer may result, at least sometimes, from the neurosis. In ulcer the pain appears when the acid flow begins, and is aggravated instead of relieved by the taking of food; it is also characterized by a sharply localized tenderness in the majority of cases and usually there is vomiting of blood. There is also a constant dull pain, passing through to the back.

There is a form of acid gastritis, symptomatically almost identical with hyperchlorhydria, the treatment exactly the same. The main difference is that in acid gastritis the stomach washings contain mucus and epithelial debris suggestive of inflammatory action. It can readily be conceived that during the first stage of a low-grade inflammation of the mucosa the parenchymatous cells may be excited to increased secretion, to be followed later by destruction of glands or diminished activity. Boardman Reed gives especial prominence to acid gastritis and believes that many supposedly neurotic cases are really inflammatory. It is easy to see that an acid-bathed stomach may become later an inflamed one if the hypersecretion is not checked.

The prognosis of hyperchlorhydria is good, though its complications may cause permanent trouble.

**Treatment:**—Any depraved state of the general health should receive appropriate treatment; but in many cases it is difficult to fix a neurotic basis.

Diet is of the utmost importance and by its careful adjustment the case may in many cases be cured without other treatment, provided there is no very strong underlying neurotic diathesis. In some cases the nervous condition seems to depend rather upon the disorder of digestion

than the reverse; at any rate, proper treatment of the stomach trouble will do more to effect a cure than in most other gastric neuroses. In dieting these patients keep in mind the following facts:

1. That the digestion of proteids is unimpaired; indeed, it may be somewhat too active. Albumen enters into combination with HCl and thereby arrests, naturally, the overacidity.
2. That the period of starch digestion is somewhat shortened on account of the rapid appearance of HCl in the stomach, the conversion of carbohydrates taking place only in an alkaline medium.
3. That stimulating foods of any kind, whether mechanically irritant, stimulating from heat, or from the presence of irritant volatile oils (condiments), or from a rich content of extractives (red meats), serve to increase the flow of HCl.

The *diet* should contain considerable albuminous food, sufficient to combine with all the free acid, but this food should be as free as possible from irritant substances. We therefore exclude condiments, very hot drinks of all kinds, and reduce the amount of red meats to a minimum; regarding the use of meats there is, however, a difference of opinion, some physicians recommending their use, usually raw and minced since they enter into combination very readily with the free acid in the stomach. The objection to their use is that, while they give great temporary relief, they delay rather than aid permanent cure. Where it is agreeable to the patient milk is the best food for acute stages; it should be given in small amounts, about six ounces every two hours, warm not hot, and sipped slowly. The pain is usually relieved at once. To prevent curdling as well as for the alkaline effect it is a good plan to add a little Vichy, lime water or soda. After the irritation has somewhat subsided in severe cases a little toasted bread, zwieback or cracker, in milk if preferred, may be taken.

After the acute attack has subsided it is seldom necessary to lay down a rigid dietary, if general attention is given to the underlying principles. Since these attacks are likely to follow dietetic errors the patient should be given to understand the necessity of abstemiousness, of simplicity in the choice of food, of thorough mastication and avoidance of all stimulants. The meals should be small but frequent enough for relief. The following is a sample day's dietary as suggested by Stockton: At breakfast, a soft boiled egg, a dry stale roll and a bit of broiled bacon; in the middle of the forenoon a glass of hot milk; at noon zwieback and the warm milk; middle of the afternoon, a glass of milk; in the evening a substantial dinner, of fish, beef or mutton with vegetables, but no dessert.



All acids disagree with these patients and for this reason the *fresh* acid fruits and vegetables such as strawberries, cherries, oranges, lemons, tomatoes etc., are likely to make trouble, setting up severe paroxysms of pain two hours or so after eating. Fruit juices and acid wines have a similar effect. On the other hand, fats and oils check the secretion of HCl, and may be decidedly beneficial; an abundance of cream, butter, olive oil, etc., not only favorably influences the gastric condition but helps to improve the nutrition.

Carbohydrates should be taken in accord with the digestive capacity of the patient. Large quantities are not only undigested in the stomach, but on account of the large quantity of acid chyme thrown into the duodenum, its digestion is interfered with in the intestine. Take what can be used and no more. It may cause fermentation and gas formation in the stomach, in spite of the large amount of HCl; yeast fungi are nearly always present and act readily upon undigested starchy food.

*Medicinal Treatment:*—The drugs of most general value in hyperchlorhydria are the alkalies. These are given during the height of digestion to neutralize the excess of acid. Nearly every individual who suffers from "heartburn" has learned of the relief that can be secured from a dose of soda. There are few better remedies. It should be taken after meals, just before the inception of the expected pain. One half to one dram is the usual dose. It may be taken in milk, as already suggested, or in water. Calcined magnesia has the added advantage of relieving somewhat the accompanying constipation. Vichy or other alkaline waters serve the same purpose and have this advantage—they help to deplete purses which are too plethoric to appreciate the advantages of the cheaper remedies.

With the alkali or alone the physician may also administer such gastric sedatives as bismuth subnitrate and cerium oxalate.

The remedy which has the most decided effect upon secretion is atropine; this checks hypersecretion from the stomach, just as it does from other mucous surfaces. Sometimes this remedy has a remarkable influence upon these cases, and it should certainly be given a trial in every severe case. Codeine, which relieves pain and modifies secretion, is *not* to be recommended. The pain is so readily relieved by proper diet and alkalies that resort to narcotics is not to be thought of, especially in neurotic patients.

#### HYPOCHLORHYDRIA; SUBACIDITY

While a deficient secretion of HCl is one of the characteristic symptoms of chronic gastritis and carcinoma of the stomach, it also occurs

not infrequently as a neurosis. In the first-mentioned disease, however, the reduction in the quantity of acid is constant, while in the neurosis it usually varies; indeed, periods of subacidity may alternate with normal or excessive secretion. Defective secretion causes no symptoms provided the motility of the stomach is good and it empties itself promptly; in such cases the work of digestion is taken up and completed in the intestines. With defective motility, however, there is stagnation of food in the stomach, fermentation, gas formation, a sense of fullness, eructations and other symptoms of poor digestion. If there is much proteid food it decomposes and interferes with intestinal digestion, the patient passing foul-smelling stools and suffering from constipation, occasionally varied by diarrhea. Starch digestion is better than proteid digestion. If the condition persists nutrition is impaired.

In gastritis the subacidity is more constant and the stomach washings contain mucus and epithelial debris.

Gastric cancer presents a picture hardly to be confused with neurotic subacidity. In cancer there is excess of lactic acid, absence of HCl usually, pain some hours after eating, vomiting of blood, "coffee-ground" like in appearance, cachexia and emaciation, some fever, and the presence of a tumor.

The prognosis of nervous subacidity is usually good.

**Treatment:**—In these cases the carbohydrates are most easily digested and should be quite largely depended upon, avoiding things which ferment easily, and bulk and liquids when there is a tendency to stagnation. Starch digestion may be aided by diastase and malt extracts, when they seem indicated. Proteids should be given in a form to stimulate gastric secretion; here finely chopped meats are indicated and the use of condiments is not only permissible but they may even be decidedly helpful. Watch the stools and do not give proteid enough to cause fetid discharges. HCl after meals is indicated; pepsin is usually not required, since the quantity of pepsinogen secreted is generally sufficient, only acid being needed to convert it into an active form. In a few cases, however, the addition of a little pepsin seems to do good, whatever the theoretic indications. The hydrochloric acid should be taken in generous doses (20 to 30 drops of the dilute acid) in water through a glass tube. Take half an hour after eating. Papayotin is excellent in this class of cases. The bitter tonics are indicated. Quassin, taken in solution, or in granule form, dissolved in the mouth, is indicated here. Capsicin also acts nicely. If food stagnates, it may be necessary to resort to the stomach tube, as in chronic gastric catarrh (which see).



**Achlorhydria; Achylia Gastrica:**—In this neurosis there is an entire absence of hydrochloric acid from the gastric secretion. The only other conditions in which this occurs are carcinoma of the stomach and chronic gastric catarrh with atrophy of the gastric glands. This produces no symptoms so long as the motility of the stomach is unimpaired and the intestines are able to do the additional work thrown upon them by the gastric insufficiency. The symptoms are those due to food stagnation in the stomach—gas formation, a sense of fullness, nausea and vomiting of a fermenting mass of undigested food. The discomfort arises soon after taking food into the stomach, and is relieved by emptying the stomach, by vomiting or the tube. The fermentation and putrefaction of food inclines to the production of diarrhea from time to time. Headache, coated tongue, sallowness, nervousness and similar symptoms, characterize these atonic forms of indigestion.

The treatment is essentially the same as of subacidity (hypochlorhydria). Give food in small quantities, in as finely a chopped or comminuted a form as possible, so that it may be reached by the intestinal juices and the ferments employed to the greatest degree possible. Hydrochloric acid, pepsin and bitters should be used after meals. In some cases excellent results are obtained by the use of the vegetable proteid enzyme, papayotin. This has the advantage of acting in an alkaline as well as acid medium.

## VIII. DISEASES OF THE INTESTINES

### GENERAL CONSIDERATIONS

**The Feces:**—Only of late is attention being given to routine examinations of the feces. Visual inspection may detect parasites, tumor fragments, foreign bodies, concretions, blood, bile, pigment, fat, pus, mucus, and food residua. The shape of firm masses may be ribbon-like from outside pressure or pipe-stem from passage through a stricture, or scybalous from retention in pouches. Excess of fat gives a silvery appearance, or the fat may float on the surface of liquid stools. Mucus may appear as jelly masses, water or milk white, sago grains or mixed through the stools. Scybala may be streaked with blood or covered with pus. Dark stools are usually long retained. Alcoholic stools are white, putty-like. Blood exuded high up the small bowel appears as tarry masses, unless quickly passed from excited peristalsis. Gallstones and other bodies may be found on passing the fluidified feces through a sieve. The odor of the stools is an impor-

tant indication. An increase of the ordinary bad odor indicates absence of the antiseptic intestinal secretions or abnormal retention and decomposition. Iron and charcoal as well as bismuth blacken the stools; logwood imparts a peculiar reddish tint.

By the microscope we may detect the small parasites and their eggs, and innumerable bacteria and food remnants. The degree of digestion of various elements is of import. Triple phosphates indicate retention. Chemic examination detects bile pigment, ferments, fatty acids, blood, indol, etc. Bacterial tests supplement the microscopic.

*Physical Examination:*—Inspection and inflation help in diagnosing local obstructions, and other phenomena. Palpation is an important aid. The patient lies on the back with the abdomen relaxed, though many times this must be aided by examination while lying on the face, as when heavy tumors retreat beyond reach. When the intestines are distended with air or water displaced organs and neoplasms usually return to their normal locations. Contracted bands of intestines may be recognized, as well as dilated portions. Percussion detects fluid accumulations, free or circumscribed, as well as enlarged or displaced viscera, and gaseous or fecal collections. Auscultation has revealed chronic intestinal indigestion by the splashing when air and fluid are forced through a narrow like the ileocecal valve. A dilated colon may occasion similar sounds. Paralysis may be detected by cessation of the normal peristaltic sounds. Inflammation contributes friction sound, and auscultation during forced gaseous distension may reveal the location of obstructions.

With the most careful use of these methods of physical examination it is sometimes difficult to make a correct diagnosis, and especially to determine the presence and nature of masses that may be fecal or otherwise. The intermittent appearance of blood or pus in the stools with localized pain and tenderness sometimes signifies the presence of a hematoma or an abscess communicating with the bowel periodically.

## INTESTINAL CATARRH; ENTERITIS

Intestinal catarrh, or enteritis, is an inflammation of the intestinal mucosa. It may be acute or chronic and the symptoms vary considerably according to the seat of the inflammation. In some cases the small bowel is most affected; in others the large bowel; while in others the entire intestinal tract may be involved—even the stomach occasionally partaking in the inflammatory reaction (gastro-enteritis). Different names are given to the disease, according to its location. Thus



## ACUTE INTESTINAL CATARRH.

may have duodenitis, jejunitis, ileitis, typhlitis, colitis, sigmoiditis, proctitis; or we may have mixed forms, as ileo-colitis, etc. These will be discussed later.

In both acute and chronic inflammation of the intestine there are primary and secondary forms; in the first case the bowel is the part primarily affected; in the second case the disease is dependent upon some affection of the body elsewhere.

## ACUTE INTESTINAL CATARRH

This may occur at any age but is most common in children. The most common cause is the ingestion of food which is indigestible or tainted. Thus decomposing milk, meat, fish, etc., are particularly prone to cause an inflammatory reaction within the intestine, due to the evolution of the saprophytic bacteria and their poisons, the ptomains. Too large quantities of ordinarily digestible food, ice-cold drinks, impure water (even a mere change of drinking water), unripe fruits, foods which contain mechanical irritants and many drastic and poisonous remedial agents, such as croton oil, arsenic, lead, etc., act as causes. Variations of temperature in the summer months in some way predispose to the causation of the disease, probably through the production of disturbance. It may also result from the production of poisonous substances within the body; thus it is well known that extensive burns frequently cause diarrhea and may even produce intestinal ulcers. The germs introduced into the intestinal tract, such as the colon bacilli, may also occasionally set up inflammatory diarrhea. Less common are the secondary enterites which may accompany debilitating diseases of the heart, lungs, liver and kidneys, or be associated with any of the severe infections.

**Pathology:**—As already stated any portion of the intestinal tract may be affected, though the colon suffers most frequently. Osler says that "changes in the mucous membrane are not always visible," and that the three signs of catarrhal inflammation, redness, swelling and increased secretion, may all be absent post mortem. The tips of the valvulae conniventes are likely to be somewhat injected and there is some sticky mucus, but as a rule the mucosa is pale and anemic. The Peyer's patches and solitary follicles are usually prominent; the latter may present eroded areas in their centers, the so called follicular ulcers. The more intense inflammations, as for instance in the severe toxic infections, may be decided hyperemia and perhaps some loss of blood.

**Symptoms:**—The principal symptom, in the majority of cases, is diarrhea, but its intensity and even its presence depends not only on the severity of the attack but also upon the localization of the inflammatory area. An attack usually comes on rather suddenly with more or less colicky pain in addition to the diarrhea. The stools vary in number; there may be but two or three in the twenty-four hours, or twenty or more. The first passages are usually fecal in consistency and odor, soon becoming mushy, and finally are entirely liquid. The color varies according to the amount of bile mixed with them; usually brown at first, later they become yellowish or grayish yellow. The reaction is acid and the discharges are irritating to the anal region. The pain varies greatly in intensity. In some cases the patient suffers only a slight inconvenience; in others it is paroxysmal, associated with nausea and possibly vomiting. As a rule there is little or no elevation of temperature. There may be more or less rumbling in the bowel due to the passage of gas and the presence of liquid stool. There is usually some tenderness in the abdomen.

The symptoms vary according to the location of the disease. When the upper part of the bowel is mainly affected the patient suffers little if any from diarrhea; in this case digestion is most impaired and there is more or less undigested food in the fecal matter. The lower the area affected the greater the amount of diarrhea. If the rectum is the principal seat of inflammation there is likely to be most distressing tenesmus with a constant desire to go to stool. If the sigmoid is greatly inflamed the tenesmus is not quite so severe and backache may be very troublesome. With acute colitis there is more or less tenderness over the entire colon. With duodenitis there is often jaundice; this condition is, in fact, the cause of the common catarrhal jaundice. Tenderness in this region following a burn is always suspicious. Look out for duodenal ulcer.

Help in the way of localization may be obtained by observing the stools. It should be remembered that the stools are formed into fecal masses in the large intestine. Liquid, formless stools point toward inflammation of this area. A greater percentage of food fragments is to be expected when the small intestine suffers. Mucus is present in practically all cases of enteritis and is diagnostic. If it is intimately mixed with the stool, the upper portion of the intestine is at fault. If it comes out in strings and fragments with the fecal mass it is probable that the colon is inflamed; if it follows the stool after much straining, appearing as a glairy mass, probably showing some staining with blood, the patient has a proctitis.



Examination of the urine usually shows indican. The bacteria in the stools are very numerous.

**Prognosis:**—Primary cases, when properly treated, usually recover promptly. The prognosis in secondary cases depends upon the nature and severity of the original disease.

**Treatment:**—The first thing to be done in a case of this kind is to thoroughly clean out the digestive canal. It is absolutely essential that the fecal irritant be removed completely, and rapid and complete relief can not be expected without this. Commence with small doses of calomel, giving to an adult ordinarily  $\frac{1}{4}$  grain every hour or half hour until a grain has been taken. This not only acts as a cathartic but also quiets the stomach and stimulates the flow of bile, acting thus as an intestinal antiseptic and deodorant. Within an hour after the last dose of calomel give the effervescent magnesium sulphate (saline laxative) in one or two teaspoonful doses, repeating every two hours till stools are odorless. In many cases it is also necessary to wash out the lower bowel with enemata or colonic tube. Where the inflammation is seated in the lower bowel and the stools are very foul this is generally necessary, and nearly always so in very young children with severe symptoms. If vomiting is severe it may be a good plan to wash out the stomach also. If there is severe tenesmus small doses of codeine (1-12 grain to an adult) may be administered with the calomel; opiates may be needed—often however the spasm is better relieved with atropine or hyoscyamine—especially if the skin is cold and pale. As soon as the bowels begin to act freely commence with the sulphocarbolates, using ordinarily the zinc salt; one to five grains may be given every two hours to an adult. With an irritable stomach the compound tablet of the sulphocarbolates, the "intestinal antiseptics," may be better tolerated; a five grain tablet every two or three hours is usually sufficient. Bismuth subnitrate may profitably be used at the same time as the sulphocarbolates, as it has a desirable local action upon the inflamed bowel and is slightly astringent.

If the inflammation is in the lower bowel and tenesmus severe, local applications may be made. Thus, irrigations with tannic acid,  $\frac{1}{4}$  to 1 dram to the quart, or with nitrate of silver, 5 grains to the quart, may be used. They should be retained a few minutes if possible. Solutions of boric acid, common salt, salicylic acid, etc., answer practically the same purpose. Clean out the lower bowel before using medicated injections.

During an acute attack stop all food, commencing when it has subsided with mildest broths and gruels. Give no cold drinks, but

the patient sip warm drinks—as fennel or chamomile tea. Keep the abdomen warm with hot flannels, hot water bag or other hot applications. Absolute quiet—patient on his back in bed. Let the extremities be kept warm.

## CHRONIC INTESTINAL CATARRH

**Definition:**—This is a chronic inflammation of the mucous membrane, giving rise to various symptoms, according to its localization.

**Etiology:**—Chronic enteritis may result from a succession of acute attacks of the character just described. Prolonged and persistent abuse of the digestive function may produce it, just as it does chronic inflammation of the stomach—indeed it may follow chronic gastritis, the intestinal inflammation resulting from persistent bowel overwork, due to improper care or feeding. The disease may be primary or secondary. Secondary forms accompany diseases of the heart, lungs, liver and kidneys, and diabetes. Intestinal parasites, worms, etc., may cause secondary inflammation of the mucosa.

**Pathology:**—The affected portion of the mucous membrane has a reddish brown or grayish color, the vessels are much distended and curved and twisted; the surface of the mucous membrane is covered with tenacious, transparent mucus. The membrane is usually thickened, sometimes very much so, and this may cause stenosis. In advanced cases the intestinal mucous membrane may be atrophied, as in the similar disease of the stomach. Often there is more or less extensive ulceration, especially affecting the follicles. Occasionally, instead of appearing as above described, the mucous membrane has a blackish or slate color with black dots at the top of the villi and also around or in the follicles. The latter gives it the so-called “shaved-beard” appearance. The inflammation, together with ulceration increases the amount of fluid in the intestine. This may be bloody or purulent, depending upon the nature and extent of the inflammatory process.

**Symptoms:**—As in the acute form of the disease the symptoms depend largely upon the portion of the bowel affected; if it is localized in the small intestine the main symptoms are those of indigestion; if in the large intestine, diarrhea. The disease may exist for some time without causing subjective symptoms. Usually however there is more or less discomfort and a tendency to the formation of gas. This discomfort usually appears several hours after the ingestion of food, or if there is diarrhea shortly before the evacuations. The indigestion is shown by borborygmi, bloating, the passing of flatus and other annoying symptoms



of this character. This gas formation may also give rise to various disagreeable symptoms due to the pressure which it exerts, such as asthma, palpitation of the heart, etc. Belching or passing of wind gives some relief. If the indigestion is severe the patient suffers from innutrition and this is particularly the case when there is an associated catarrh of the stomach. He loses weight, becomes weak, irritable in temper, suffers from cold extremities, headaches, anorexia, etc. These symptoms are in all probability due to intestinal autotoxemia. The symptoms above described are most characteristic of catarrh of the upper intestine. In such cases the tendency is to constipation but this often alternates with attacks of diarrhea due to the fact that the accumulating fecal matter is very prone to undergo decomposition, thereby becoming an irritant of the bowel and setting up diarrhea. These attacks of diarrhea are followed again by constipation.

When the inflammation is mainly limited to the lower bowel the principal symptom is diarrhea. Usually there are a number of passages, from one or two to six or eight daily; these may occur in the morning only. The character of the stools varies greatly. Usually there is some undigested food and almost invariably there is mucus; in fact the presence of mucus is characteristic of enteritis. The localization of the process may often be determined by the degree of admixture of the mucus in the stool, as described in the preceding article. The presence of ulceration is shown by pus and blood. Usually the stool will be somewhat blood-streaked from eroded vessels, especially if the inflammation is well down in the bowels. The more frequent and painful the stools the lower down in the intestine is the disease; in proctitis, tenesmus is troublesome.

**Diagnosis:**—This disease is usually easy of diagnosis. When however, the process is high up in the small intestine there is considerable likelihood that the trouble will be ascribed to stomach disease—especially if there is a prior history of gastric catarrh. Examination of the stomach contents and of the stools will usually clear up the diagnosis.

Mucomembranous enteritis is a disease of nervous women, characterized by the passage of large quantities of mucus with paroxysms of pain. In this disease there is no pus or blood in the stool and the patient has a neurotic history. With a little care there should be no trouble in diagnosing ordinary cases.

**Prognosis:**—Chronic catarrh of the intestine is a persistent disease and in the aged, debilitated or very young, it may be fatal. It has a tendency to hang on for months and even years, though when treated early and intelligently cure is possible in a majority of cases.

**Treatment:**—Hygiene and diet are of the utmost importance. The patient should adjust his life and his habits to his condition. He should live out of doors as much as possible, take mild exercise of a character which does not exhaust, clothe himself warmly keeping the extremities and abdomen at an equable temperature—in fact he should avoid all extremes and lead a sane, temperate life. The diet should be adjusted to the condition of the gastric chemistry as revealed by examination of the stomach contents after a test meal. It is important that enough food should be given to maintain the nutrition; and it is equally important that the food should be of a character that the patient can utilize. Usually eggs, lean meats, bread, butter, mashed or baked potatoes, rice, cream, etc., may be taken without difficulty. If there is intestinal indigestion foods should be used that are largely digested in the stomach and it may be necessary to add an artificial digestant, such as pancreatin or papayotin. If there is constipation the free use of fruits, vegetables and the more easily assimilated fats is advisable. If there is diarrhea the patient should avoid the laxative fruits, the various wines and mineral waters and the more laxative vegetables such as cabbage, and the like. After all the patient must be in the matter of digestion something of a law to himself. The diet must be simple. Let there be no course dinners, no rich sauces, gravies nor pastries, no extensive admixture of different articles of diet at the same meal.

As already stated the artificial digestants may be needed. If stomach digestion is weak the patient may require hydrochloric acid, pepsin, papayotin, or possibly quassin as a gastric stimulant. If the pancreatic function is not properly performed pancreatin may be needed. But probably of the greatest importance is regulation of the bowels. If the patient takes no food which is irritant and does not permit irritant substances to be manufactured in the intestine, which add to and perpetuate the catarrhal condition of the intestine, then the chance for rapid recovery is good. As far as possible, the bowels should be regulated by the diet, but it is practically always necessary to supplement this by suitable medicinal treatment. If there is a tendency to fecal accumulation or to putrefactive changes, an occasional "cleaning out" with calomel in small repeated doses, followed by effervescing magnesium sulphate, is advisable. In many cases the calomel and saline purge may be repeated once or twice a week with decided benefit. Usually, however, after a thorough cleaning out the action of the bowels may be maintained by a daily morning dose of the saline. In Europe rich patients go to Spas and drink the natural purgative water, and these are certainly very effective; but just as good effects can be secured in the average case at a minimal



expense by the use of the saline. The ordinary purgative pills are not to be recommended; they are bowel irritants and their tendency is to increase rather than alleviate the inflammation. As supplementary, however, to the saline, when this does not prove sufficiently active, we would suggest the use of small doses of podophyllin or juglandin. The bile acids (bilein), by supplementing the natural secretions of the liver and stimulating the hepatic functions undoubtedly do great good in this class of cases. Indeed it is of the utmost importance that the work of the liver should be kept up to par, since here we are dealing with a depraved condition of the intestinal tract inevitably resulting in the formation of poisons which the liver must take care of. Emetine for this reason is also a valuable remedy. Intestinal antiseptics are also indicated, especially in cases associated with diarrhea or with putrid stools. The best form of administration is the compound sulphocarbolates. Of remedies acting directly upon the inflamed mucosa bismuth is one of the best; the subgallate may be given both for its local and astringent effect. Nitrate of silver given in keratin coated pills so as to pass unchanged into the intestine has also been recommended. One-fourth grain is the usual dose.

When the seat of disease is accessible from the lower end of the bowel suitable irrigation or topical application should be employed. Nitrate of silver in solution may be used as recommended in the preceding article.

Daily cleansing with normal salt solution is good in colonic inflammations. Sometimes a one per cent alum solution does good, while creolin, salicylic acid, boric acid, and protargol, argyrol and other silver salts will naturally suggest themselves as valuable in some cases. Whenever a local application is to be made to the bowel remember that it must be first cleaned out with enemas or the long colonic tube. Whatever you do, do thoroughly. Persistence is absolutely necessary, for this is an essentially chronic disease and cannot be cured by helter-skelter, intermittent or careless medication.

### CHOLERA INFANTUM.

**Definition:**—Cholera infantum is an intense intoxication of the intestinal tract in children, probably of bacterial origin, and characterized by intense vomiting and the passage of abundant watery stools, great prostration, rapid wasting and a tendency to early fatal issue.

**Etiology:**—Cholera infantum occurs almost exclusively in milk-fed, bottle-raised babies, under two years of age. While the recent studies

of Duval and Bassett point to the probability of the specific action of a microorganism, there can be little question that the poisons bred in infected milk are mainly responsible for its occurrence. Poor hygienic conditions predispose to it. It is a disease of the summer months.

**Pathology:**—There are no very marked morbid changes in the bowel to be found after death. There are some evidences of a catarrhal process in the mucous membrane of the stomach and bowels, especially of the latter; there may be ulceration of the intestinal glands. The symptoms evidently depend largely upon the profoundly depressing effect of the toxins upon the central nervous system, which causes paresis of the intestinal wall and as a consequence free leakage of fluid into the bowels. There is some cloudy swelling with other evidences of degeneration of the cells of the liver and other large glands and important organs of the body.

**Symptoms:**—The disease may be preceded by mild diarrheal symptoms, with pain and restlessness; but it generally commences abruptly. In its symptomatology it closely resembles Asiatic cholera. There is from the start great prostration attended by nausea, vomiting, purging, and high fever. The little one first throws up any food that may be in the stomach, then ejects mucus, bile and large quantities of serum. The discharges from the bowels are at first fecal in character, and acid in reaction but soon become watery, alkaline, greenish in color and have a stale, musty odor. They are very frequent and very profuse. The water drawn from the body is enormous in quantity; it goes through the diapers and may even soak through the bed-clothing. As this loss of fluid goes on the child rapidly loses in weight and in a few hours the rotundity of the form is lost, the fontanel becomes depressed, the features sharpened, the abdomen sinks and the surface of the body is pale and cold. The little patient rapidly passes into a semicomatose condition, from which it seldom revives, lies with eyes partially open, ceases crying and only moans. Sometimes death is preceded by convulsions; or the child may pass into a hydrocephaloid condition, with retraction of the head. The rectal temperature may be very high (106°F or more) while the surface of the body is cold. When recovery is to occur the stools gradually become less frequent, and more fecal in character and the vomiting ceases. Convalescence is slow.

**Diagnosis:**—The symptoms of cholera infantum are characteristic and the disease can hardly be mistaken for anything else. The profuse watery stools, the great prostration and the rapid wasting make up a symptom-picture to be found in no other disease except Asiatic cholera. Nevertheless some physicians have erroneously applied the term "cholera infantum" to cases of gastroenteritis.



**Prognosis:**—This disease is very fatal. Most of these little patients die, fully 90 per cent of those less than six months of age.

**Treatment:**—Cholera infantum is usually a preventable disease. Indeed the teaching of the medical profession concerning the importance of cleanliness and the most scrupulous care in the preparation and administration of food has here borne fruit; the disease is now uncommon.

At the beginning of an attack of infantile diarrhea of any kind, food should be immediately stopped and not resumed for twenty-four hours at least. Milk is absolutely forbidden. When there is commencing tolerance for food a little barley water, meat juice or light broth may be given tentatively. If, however, the case develops into one of true cholera infantum it is useless to try to give any food.

The entire intestinal tract should at once be cleaned out, the lower bowel by enemas, or a soft rubber catheter used as a colonic tube. The stomach may be emptied in a similar way if vomiting is troublesome, as it nearly always is. If the case is seen while there is still some gastric tolerance small doses of calomel may be given, say 1-20 grain every half hour for five or six doses, following with saline laxative or rhubarb, with sulpho-carbolates, as later directed. Employ, also, lavage, gastric and intestinal, to completely clear the digestive tract. In using enemata it is a good plan to use normal saline solution, leaving a small amount for absorption, with the hope of replacing somewhat the large amount of food withdrawn into the bowel from the tissues. A small amount of tannic acid may also be added to the injection, both for its astringent effect and to neutralize the alkalinity of the stool. The sulphocarbolates may also be added to the injected fluid. In some cases if loss of body fluids is very great, subcutaneous injections of the salt solution are advisable.

Atropine is the best remedy when the stomach can retain nothing; this may be given hypodermatically in doses of gr. 1-1500 to 1-500, repeating sufficiently often to get and maintain the physiological action. Morphine is generally advised, and while it may possibly be of service early it certainly is contraindicated in the later stages when the patient becomes semicomatose; it is doubtful if it is ever indicated. If given at all it should be in doses of gr. 1-100, to restrain excited peristalsis. Narcotism is readily induced and very fatal. To maintain the strength and restore the tension to the paretic vessels and tone up the intestinal muscle strychnine is of the utmost value, though in young children brucine is often to be preferred. Either of these alkaloids may be given hypodermatically if the stomach will not tolerate them. Intestinal anti-

sepsis is of value, but the slight tolerance of the stomach for drugs makes it difficult. However, copper arsenite may usually be retained, if given in solution and in sufficient dilution; 1-3,000 to 1-1,000 of a grain may be given every ten minutes to half hour; after vomiting has ceased and the stomach has become sufficiently tolerant give zinc sulphocarbolate in  $\frac{1}{2}$  to 2-grain doses every hour.

The advice is usually given to administer stimulants in the form of iced brandy or champagne. More effective than these and less likely to do harm are small doses of glonoin, which, with strychnine, strengthens the heart and brings the blood to the surface, where it may be kept by the judicious use of atropine. If fever is high aconitine, fortified by cactin or digitalin should always be used. Pain may be relieved by Waugh's anodyne for infants.

Local applications such as the spice poultice, are usually employed, though hot dry flannels answer the same purpose. The limbs should be kept warm, and where the entire surface of the body is cold the hot pack may serve to bring the blood to the skin.

Under the usual treatment, as stated above, about 90 per cent may be expected to die. The writer will take the risk of being set down a braggart by stating here his conviction that the physician who loses a case of this sort is responsible for the death. Begin with the first loose or fetid stool from a child in its second summer; give at once calomel gr. 1-20 every half hour if nausea or vomiting is present, continuing till this ceases or for six doses; then proceed with the alkaline syrup of rhubarb to which has been added sodium sulphocarbolate 10 grains to the ounce. Of this give a teaspoonful every two hours until the stools are healthy. If in a few hours there is not a change for the better, or immediately if the symptoms are choleraic, begin giving chemically pure zinc sulphocarbolate, from gr. 1-6 to grs. 2 every hour until the danger is past. Do not worry over the child's inability to retain medicine—this will settle the stomach. If peristalsis and vomiting are excessive give a full hypodermic of atropine to sedate the vagus—it will do it. If the zinc is persistently vomited it is impure.

This is *the* treatment of cholera infantum. Under it you should not lose a patient. Not 90 per cent, and not 1 per cent. The writer has thus treated all cases coming to him since 1880 and has not lost one solitary case. But when he says chemically pure zinc sulphocarbolates he means exactly that and nothing else. When the writer was lecturing on this topic to his class, one of the students said: "Well, we are to have our first death from cholera infantum." "Indeed, and what is that?" "A child at the dispensary clinic, which has been treated under your



system, but the child was too far gone and had too little vitality when it was first brought to us." This seemed sad, and I asked if it had been treated with zinc sulphocarbolate. The reply was, "Yes"—and then the student corrected herself and said—"Salol." Oh! We gently but firmly insisted that salol was not sulphocarbolate, and the latter was substituted. Needless to say that the patient recovered. It is not a question of the principle of intestinal antiseptics, but of the specific agent employed to secure it, and our 27 years' experience has firmly convinced us that in cholera infantum the one effective remedy is zinc sulphocarbolate. Can we be blamed for feeling injured, when people assume that this means any intestinal antiseptic in any dose and manner, and as calomel is a good member of this class the old and tried and found wanting methods are, the same as those we advocate, and our story is a tale that is told and not worth again hearing? If our readers desire to test our method, test *it* and not something else.

See to the hygiene of the premises sedulously. Change absolutely the food so as to starve out all microbes—dropping milk absolutely and using first barley broth or rice water, and from that go to pure, fresh, sound fruit juices. After a week of each, return to meat broths, or the predigested foods.

After the choleraic stage has passed we will face a stage of intestinal inflammation, and this requires the treatment of enteritis.

## INFANTILE DIARRHEA; ENTERITIS IN CHILDREN

**Etiology:**—This is a very common disease of infants, especially between the ages of six months and two years. While it is not infrequent in breast-fed babies, owing to improper surroundings or personal hygiene, or as a result of too frequent or irregular nursing or a poor quality of breast milk, in most cases it occurs in bottle-fed babies. The predisposing causes are high temperature and improper food. It is a disease of the summer months. The summer heat not only depresses the sensitive nervous system of the child and upsets the vascular equilibrium but also favors the decomposition of food products. Milk, the principal food of young children, readily undergoes dangerous putrefactive changes, which makes it dangerous unless great care is taken in its preparation and preservation. Unclean utensils and the long-tube milk bottle have been responsible for many deaths. Nearly all cases of summer complaint in children are undoubtedly milk toxemias. In older children unripe fruit and other indigestible food may be responsible for the trouble.

Duval and Bassett have found the bacillus dysenteriae of Shiga in many cases of this disease and it is probable that it is specific in some cases at least.

**Pathology:**—There are no distinctive morbid changes, aside from a slight hyperemia, or a slight catarrhal inflammation.

**Symptoms:**—The simpler form of the disease, known as *acute dyspeptic diarrhea* is due simply to overloading the stomach or improper food. The symptoms, however, are often out of proportion to the cause. They may appear gradually, preceded by fretfulness and loss of appetite, or come on suddenly, often in the night. There is usually nausea, vomiting and diarrhea with colicky pains. In rare cases there may be convulsions, while the temperature may go up rapidly and be high—possibly 104 to 105. The stools are numerous, at first feculent, and containing casein and fragments of undigested food, gray or yellow in color; later they are thin and acid—or very offensive if there is decomposition of proteids. Mild cases under proper treatment recover within a few days, or as soon as the bowels have been thoroughly cleaned out.

In *entero-colitis* the early symptoms are much the same, but the symptoms more pronounced, the depression greater, the pain more severe. If the lower bowel is most affected, as is quite likely to be the case, there is more tenesmus, the stools are more frequent, and they often contain mucus and are blood stained. The abdomen is distended and tympanitic along the colon, fever is present and constant, and there is a distinct tendency for the disease to become subacute or chronic. This form of the disease is distinctly a toxemia and carries off many children in the summer months.

**Prognosis:**—Good in the dyspeptic cases and usually good in enterocolitis if treatment is prompt and intelligent. In some of the cases, however, the toxemia is intense and carries off the patient in a few days, while in others it assumes a chronic form and after six weeks or so usually results in the patient's death.

**Diagnosis:**—The differential diagnosis between the dyspeptic and inflammatory forms has already been pointed out. The ordinary summer diarrheas are often confused with cholera infantum. In the last named disease the great thirst, the profuse watery discharges, the profound prostration with supervening collapse symptoms and the rapid wasting, are quite characteristic.

**Treatment:**—Summer diarrhea is a preventable disease. If proper attention is given to the child's food and the utmost cleanliness is exercised in its preparation, preservation and administration, very few cases of the disease will occur. Especially is this necessary in giving milk,



which is particularly prone to decomposition. If the supply is questionable it should be pasteurized or sterilized. All utensils should be kept scrupulously clean. The bottle should be carefully washed and scalded after every feeding, the rubber nipples carefully scrubbed and kept in soda water between feedings. The child should be frequently bathed and the clothing adapted to the changes of temperature.

The first thing in treating an attack of summer diarrhea, whether dyspeptic or inflammatory, is to thoroughly clean out the entire digestive tract and put it at rest. If there is food in the stomach it may be washed out with an ordinary catheter used as a stomach tube, or in older children by the administration of a simple emetic—even warm water or tickling the throat with the fingers being sufficient in some cases. The lower bowel should be cleaned out by enemas or colonic irrigation. To assure the complete emptying of the intestinal tract the child should then be given several small doses of calomel (1-20 to 1-10 grain) at half hour or hour intervals, followed by a dose of castor oil or effervescing magnesium sulphate, which can be sweetened and acidulated with a little lemon juice to make an agreeable drink. If there is considerable prostration give small doses of brucine and if the skin is cold and pallid bring the blood to the surface with small doses of atropine (1-500 grain) repeated to physiological effect. Most cases require some intestinal antiseptic to check fermentation and putrefaction; zinc sulphocarbolate in  $\frac{1}{4}$  to 1-grain doses meets the indications, though in older children the compound sulphocarbolates acts better in some cases. Dr. Waugh has vividly described the marvelous changes which result from the administration of these salts in summer diarrheas. Copper arsenite, in 1-1000 grain doses, is another remedy which acts admirably in summer diarrhea, especially in duodenal troubles. If vomiting is very troublesome bismuth is an admirable remedy; it may be given with the calomel, which is one of our best gastric sedatives when given in small doses; a fraction of a drop of creosote in peppermint water is also good. Nuclein always useful.

Insist upon absolute rest of the entire digestive canal—and that means abstention from food. During the first twenty-four to forty-eight hours the baby needs nothing to eat. Absolutely forbid all milk—impress upon the parents that it is little better than a poison. A little boiled water given at frequent intervals, to which two or three drops of brandy may be added if there is much depression, is all that is needed. But if you are impelled to give some substitute for food a little barley water or egg albumen water will serve, and as the acuteness of the attack begins to subside a little Valentine's beef juice or bovine. Return very slowly to the regular diet, and leave the milk to the last.

In acute inflammation of the lower intestinal tract local treatment is demanded. Irrigate thoroughly with normal salt solution or weak boric acid solution. If there is much mucus a weak (1 per cent) tannic acid solution may be used, and nitrate of silver in the same strength if the disease shows a tendency to linger. Tenesmus may be relieved with injections of starch water to which a little opium, or better codeine, has been added.

### CELIAC DISEASE

This disease, also known as diarrhea alba, diarrhea chylosa, is applied to a subacute intestinal catarrh, occurring principally in children, and characterized by copious, frothy, pasty or gruel-like stools, which often are extremely offensive. The abdomen is distended but soft. The child becomes anemic and emaciation and loss of strength are progressive. There is usually fever. The etiology is obscure, though the filaria sanguinis hominis has been found in the stool. Ulcers have been found in the intestine but the pathology is not known. The disease usually terminates fatally.

The treatment should be along the same lines already outlined in the treatment of summer diarrhea, i. e., thorough cleaning out of the intestinal tract, the use of intestinal antiseptics, such as the sulphocarbolates, vascular tonics and stimulants, such as strychnine arsenate, cell vitalizers, such as nuclein, etc.

### PHLEGMONOUS ENTERITIS

**Definition:**—This is a suppurative inflammation of the mucous membrane of the intestine.

**Etiology:**—This is a very rare disease and usually occurs as secondary to a purulent process elsewhere or associated with septicopyemia. It may result from intussusception or strangulation or complicate exanthemata.

**Pathology:**—Abscess formation is most frequent in the duodenum. The purulent process is the same as such a process elsewhere.

**Symptoms:**—The symptoms are practically the same as those of septic peritonitis, i. e., severe pain, tenderness, tympanites and tenesmus. There is vomiting and high fever. Constipation is present.

**Prognosis:**—The disease usually terminates fatally.

Treatment is in the main surgical, medicinal measures being addressed mainly to the relief of symptoms.



## SPRUE AND PSILOSIS

This is described by Manson as "an insidious, chronic, remitting inflammation of the whole or a part of the mucous membrane of the alimentary canal, occurring principally in Europeans who are residing or have resided in tropical or subtropical climates." It is characterized by inflammation and often by erosion or ulceration of the mucosa anywhere from mouth to anus. The oral cavity may be eroded or ulcerated and there may be flatulent dyspepsia; pale, frothy, fermenting stools; a distended abdomen; anemia and wasting. The disease is slowly progressive and there is a tendency to relapses, also to atrophy of the mucosa. It is usually fatal, unless the progress of the disease is arrested by early and appropriate treatment. The treatment is symptomatic.

## CHOLERA MORBUS; CHOLERA NOSTRAS

**Definition:**—This is an acute inflammation of the mucous membrane of the digestive tract presenting symptoms of acute intoxication and resembling in some respects Asiatic cholera.

**Etiology:**—This is a disease of the heated season, and while it may attack persons of any age young adults are most affected. When it occurs in children under two years of age it is known as "cholera infantum" (which see, page 528). Poor hygiene and sanitation are predisposing causes but errors of diet, unripe fruit, decomposing food, etc., are directly responsible for the attacks.

**Pathology:**—The morbid anatomy is essentially the same as that of an acute enteritis, though the entire digestive tract may give evidences of inflammatory reaction. In some fatal cases no lesions have been found post mortem.

**Symptoms:**—The disease usually commences suddenly, often in the night, though the onset may be preceded by malaise, loss of appetite and nausea. There is at first pain in the abdomen, nausea and severe and repeated vomiting. After the normal contents of the stomach have been ejected the vomitus becomes watery and bile stained. Purging soon ensues and accompanies the vomiting. The passages are very numerous and accompanied with severe abdominal pain. The stools are at first feculent, then become thin, watery and very copious; they may resemble "rice water" stools of true cholera. There is often associated cramping of the muscles of the calves. The patient is rapidly drained of fluid; the face becomes pale and cyanotic, the features pinched and the form rapidly emaciates. There is intense thirst, scanty urine.

**The** skin is cold and clammy, though there may be a rise of temperature of several degrees. The pulse is rapid and thready. In severe cases the patient goes into a state of collapse and may die within forty-eight hours. In most cases, however, after a few hours or at most a day or two, the symptoms subside, leaving the patient much emaciated and prostrated.

**Diagnosis:**—When there is an epidemic of Asiatic cholera the differential diagnosis is very difficult; the presence of the cholera vibrio in the stools is diagnostic.

Ptomaine poisoning, resulting from eating decomposing proteids, gives practically identical symptoms. Arsenic and antimony, when taken in toxic doses, produce very similar symptoms.

**Prognosis:**—Very few people die of cholera morbus, though in the very young or old, or in the debilitated, it may prove fatal.

**Treatment:**—An effort should be made to rid the intestinal canal of the irritant. Wash out the lower bowel with normal saline solution, urging the patient to make an effort to retain it so that a portion may be absorbed to make good the rapid draining of fluids from the body. In very severe cases it may be worth while to also wash out the stomach to check the intractable vomiting. A few small doses of calomel ( $\frac{1}{8}$  grain) followed by effervescing magnesium sulphate will aid in sedating the intestinal tract as well as in clearing it of poisonous matter. To equalize the circulation give atropine sulphate 1-250 grain every half hour to hour to physiological or remedial effect. Glonoin to produce quick reaction. Also support the patient with strychnine arsenate giving 1-67 grain every hour or two hours. These remedies may be administered hypodermically if the stomach is very irritable. For relief of pain and to bring about a reaction the chlorodyne granules will prove satisfactory. Apply hot compresses or hot flannels to the abdomen and keep the extremities warm. Withhold all food during the acute stage of the disease, commencing again tentatively with a little hot clam broth or beef tea. For the thirst give cracked ice to suck but enjoin the drinking of fluids, though iced champagne may be sipped, or a little iced brandy given if there is much depression.

## INTESTINAL ULCERS

Ulcers of the duodenum closely resemble those of the stomach. They are generally found above the opening of the bile duct. When the healing has resulted in cicatricial stenosis the bowel above the obstruction becomes dilated, and the biliary and pancreatic ducts may be



occluded. Perforation may occasion peritonitis or be walled off and the fistulous opening formed into the neighboring viscera. Burns of the skin are far more prone to be followed by duodenal than by gastric ulcer and are attributed to embolism and acid digestion of the tissues deprived of their blood supply. Chronic nephritis and biliary calculi furnish cases. Duodenal ulcers are more common in males from 20 to 40. They occur only 1-30 as frequently as gastric ulcers.

The onset may be marked by intestinal hemorrhages, recurring irregularly, sometimes with hematemesis, pain coming on two to four hours after meals, in the right hypochondrium; violent gastric crises at times not related to meals, vomiting likewise not related to eating and giving no relief, occasional jaundice if the bile ducts are occluded, with no dorsal pain and no improvement on dieting. Melena in the male sex is mostly to be attributed to duodenal ulcer. This and the violent crises with pain in the location mentioned are the most diagnostic points. Hemorrhoids, cancer, tuberculosis, dysentery and hemophilia are to be distinguished. The ulcer may be latent until perforation occurs. The induration about the ulcer may afford a tumor simulating cancer. The danger to life is greater than from gastric ulcer since cicatrization is rarer. The treatment is the same as for gastric ulcer.

Ulcers form along the colon from the pressure of retained fecal masses. Constipation occurs, sometimes occasioning diarrhea, with colicky pains and tenesmus. There may be discharges of flaky or thready mucus, pus, blood, and sometimes hard black masses are dislodged with relief from aching or soreness that may have persisted for a long time. It is well to believe exceptional for these masses to be detected by physical examination. Treatment consists in thoroughly evacuating the bowels and keeping them empty until they contract, which may be aided by berberine one to five grains daily for months. Stenosis may follow the healing of such ulcers. Enemas of coal oil penetrate and disintegrate these masses when any amount of water fails to seriously affect them.

## APPENDICITIS

The vermiform appendix may present catarrhal, suppurative or interstitial inflammation. The disease may extend to the cecal and pericecal tissues.

Pervious during early life, the cavity of the appendix is usually obliterated after middle life. It may occupy almost any position in the abdomen, the pelvis, or be adherent to any of the abdominal viscera or encircle and occlude the bowel. Catarrhal inflammation rapidly

extends to all the coats of the appendix, the swelling impeding the veins, then the arteries, and abscess ensues. In the female a branch supplied from the ovarian artery gives a better circulation; hence gangrene is more frequent in the male. When infiltration occurs, rendering the organ firm and rigid, the epithelium may be cast off, the serosa hyperemic and adherent, the tube becomes obliterated and the granulations adhere, rendering subsequent attacks impossible. But if only the orifice is closed the secretions may distend the appendix perilously. Or the mucosa may ulcerate. The result therefore depends largely on the presence and degree of stenosis. Perforation may occur.

Ulceration may be acute or chronic, sometimes accompanying or following the catarrhal form, more frequently with concretion or foreign bodies. The ulcer may extend or heal, with stricture.

The interstitial form may also follow the catarrhal or the ulcerative, specific bacteria being usually concerned in the process. Gangrene is the most common and dangerous lesion, limited to a portion of the tube. Perforation and virulent peritonitis is the only termination of this form.

The peritonitis may be circumscribed or diffuse. In the former case there appears a fibrinous exudate which becomes adherent to the opposing serous surfaces, walling off the inflammatory products. A serous flow follows, forming an appendicular abscess. The location and dimensions vary, and it may contain large quantities of pus, thin, gray, fetid. The collection may be subperitoneal, and burrow to Poupart's ligament and empty, leaving a fistula for a variable period. The pus may empty into the rectum, bladder or vagina, the cecum, colon, pleura or the tissues around the kidney, the abdominal wall, hip-joint, gluteal region, scrotum, etc. Pylephlebitis has resulted, and erosion of an iliac artery with fatal hemorrhage. Thrombi forming in the mesenteric veins have contributed infective emboli to the liver, and iliac thrombosis has occasioned edema of the leg. Acute diffuse peritonitis follows perforation when not circumscribed, or when the adhesions give way.

**Etiology:**—There may be predisposing causes in structural defects stricture or old peritoneal adhesions, fecal concretions in about 50 per cent, foreign bodies in 7 per cent, ulcers, straining and traumatisms, age—most common between fifteen and thirty—sex—four males to one female—gastrointestinal disturbances, possibly heredity, influenza and other infections, poor blood-supply and retrogression, with torsion. Flatulence may and probably frequently does occasion appendicitis, the appendix being distended by gas-bearing microorganisms into the cavity. Of microorganisms the colon bacillus is most common and staphylococci next, while typhoid, tubercle and many others have been found.



Constipation favors its occurrence by allowing the numberless organisms in the bowel time to proliferate and develop malignancy.

**Symptoms:**—Many mild cases probably occur and are not recognized, the affection being attributed to indigestion. The onset may be gradual, or sudden if it can be assigned to any special causal occurrence. There may be as prodromes anorexia, nausea, diarrhea or constipation, with flatulence. The patient may be conscious of abdominal discomfort and yet be at his work, until rupture occurs or septic poisoning become apparent. Suppuration may be indicated by a rigor or chill. The invasion is heralded by abdominal pain, fever, tenderness over McBurney's point, gastric disturbance and circumscribed resistance to palpation. McBurney's point is at the middle of a line drawn from the umbilicus to the anterior superior spine of the ilium. The pain varies widely, and if there are tissues whose circulation is arrested it becomes unbearable. It is usually constant with acuter exacerbations. Severe pain may indicate peritonitis threatening perforation. It may be localized anywhere in the abdomen, but within two days settles on the appendiceal region. The fever rises to 100 to 105° F., but gravest cases may show a subnormal temperature. Some fever is, however, the rule.

The pulse rises above the fever proportionately, with exceptions. The tenderness, while usually at McBurney's point, may be at any place where the appendix is located—and this may be anywhere in the abdomen. The right abdominal rectus is rigid. About the second day a circumscribed induration may be found, with swelling that obliterates the sulci above and in front of the anterior superior iliac spine. Not always can the enlarged appendix be recognized in the mass. Vomiting occurs early and may continue, or return on dietary errors or with peritonitis. Constipation is the rule; diarrhea may come later or from sepsis. The patient lies on the back with the right leg drawn up. At first the bladder is irritable, later retention may occur. The course is usually favorable, sometimes ending in suppuration, perforation and peritonitis. If resolution occurs after a few days the symptoms subside, and small pus collections may be absorbed. Perforation may follow subacute attacks. The acuter forms show severe pain and quickly developing symptoms of peritonitis, the swelling obscuring the tumor, temperature falling and vomiting and collapse following. The symptoms are those of acute peritonitis from perforation. The heart fails and death results from true "heart-failure" due to acute sepsis. If time is permitted the abscess is walled off from the general peritoneal cavity. The bowels may then be completely obstructed.

As the patient lies on the back the affected region may be seen to project. The induration and tension yield and the tissues are doughy, from cutaneous edema. Fluctuation may be obtained in superficial collections. Rectal and bimanual examinations often reveal the difficulty when other methods fail. Percussion may afford dullness or tympanites. Suppuration may occur but the abscess becomes encysted, and it may later point in any one of a number of ways. When suppuration occurs the local symptoms are somewhat relieved but hectic may supervene, with diarrhea and colliquative sweats. A cure may follow spontaneous discharge in any safe direction. The patient may sink into the typhoid state and die.

**Diagnosis:**—Typical cases are diagnosed by the sudden severe pain in the right iliac fossa, in a previously healthy man under forty, with tenderness in the appendix, right rectus abdominis indurated, fever, vomiting, usually constipation, sometimes diarrhea. Less marked cases may present pains elsewhere, but they soon localize in the appendix, or a bimanual and rectal and vaginal examination may reveal the abnormal location of the affected organ. Induration with intense local pain and tenderness indicate approaching perforation. Gangrenous cases are deceptive, and the acute symptoms may be wanting or may subside, and the patient be allowed to go about until rupture unexpectedly occurs.

Typhlitis and fecal impaction in the cecum are said to be rare, but the writer has in his comparatively limited experience met so many cases that he can not subscribe to this. Constipation is present, with dragging pain, fever coming late, and a doughy, sausage-shaped tumor in the region of the cecum and ascending colon, dull on percussion, but without the localized tenderness and resistance, and disappearing on free purgation. In renal colic we have hematuria and pain radiating into the groin and the testicle, but no fever nor local tenderness.

Indigestion may accompany appendicitis, but is relieved by treatment if alone, and is without the local symptoms and fever. A distended gall-bladder occupies a different position and usually there is jaundice attending. Perinephric abscess has a different history, of renal disease. Ovarian or tubal peritonitis begins lower and has a history of pelvic disease. In extrauterine pregnancy the menses have been absent and the rupture is followed by collapse from hemorrhage. Acute tuberculous peritonitis is less rapid in development, there are no localized appendiceal symptoms, the tumor is movable, and the disease coexists elsewhere. Intestinal obstructions show different localization, with bloody stools in intussusception, stercoraceous vomit in strangulation, etc. Intestinal sand in the stools may indicate lithiasis. In acute hemorrhagic



pancreatitis the deep epigastric pain followed by resistance, and pancreatic symptoms, suffice. A similar decubitus is noted in disease of the hip-joint. The diagnosis from typhoid fever seems to require more than ordinary care, but surely can not be difficult. Dislocated kidneys may closely simulate appendicitis, but the sudden subsidence of local swelling and induration, with absence of the kidney from its proper location, indicate the diagnosis. These attacks from displaced kidney are known as Dietl's crises.

**Chronic Appendicitis:**—Relapses occur in at least half the cases of acute or primary forms. There may be no indications of trouble remaining, or there may be some sense of uneasiness, with tenderness on deep pressure, and digestive disorder. The local symptoms are more decided at second attacks, but each subsequent one is less decided, as the remission is less perfect, considerable pain with some fever occurring at times. Exertion and overfeeding are apt to induce attacks. Fecal retention is apt to complicate.

Edebohls thus describes his method of palpation for chronic appendicitis: "The patient lies upon his back with the examiner at his side; the latter places his right hand upon the patient's abdomen over the right rectus muscle, opposite the anterior superior spine of the ilium, and presses the left hand upon the right, so that no force is used by the right hand, and the tactile sense of its fingers is left undisturbed. The hands are drawn slowly outward, allowing the contents of the abdomen to slip from underneath them. The coils of intestine can be felt as they escape from under the hand as it presses against the posterior abdominal wall." The appendix may be detected as a tumor the shape of the finger, superficial or deeply situated. Pain and tenderness are worse if pus is present.

Each attack inflicts an injury on the patient's health, nervous symptoms developing with emaciation and progressive debility. The patient becomes irritable, apprehensive, neurasthenic and hypochondriac.

Cecal cancer presents more continuous fever and loss of strength and weight, and the course is concluded within two to three years. Hypochondria and hysteria simply require careful physical examinations. Oxaluria may cause ureteral irritation that may simulate appendiceal localization.

**Prognosis:**—In grave cases the local disease shows a tendency to spread, with high temperature and rapid pulse, and the local malady is intensely toxic. Suppuration occurs and the inflammation extends rapidly. Two-thirds of these die within eight days. In the milder form known as catarrhal recovery is the rule. The attack is milder and improvement

is evident by the fourth day. Fitz gives the general mortality of non-operative treatment as about 14 per cent. The prognosis in chronic cases is, of course, uncertain; but it improves after several attacks have been passed safely.

**Treatment:**—Opinions differ widely as to the propriety of invoking surgical intervention, the surgeon insisting that all cases are surgical and the physician's duty is to call for the operator as soon as the disease is suspected. On the other hand many physicians have treated every case met during years of general practice, without surgery and without a death. The limits are yet to be determined. We can only give general indications for the choice.

Acute and highly toxic forms with pus-formation and rapid development, those resisting other treatment, relapses increasing in frequency and severity, should be subjected to operation. Those for whom surgery is not employed should be confined to rest as absolute as can be maintained. The diet should be of articles digested only and completely in the stomach—raw beef and oysters, predigested milk, meat powders and bovine or sanguiferrin, raw egg-white, freshly pressed fruit juices, and coffee. The quantity should not exceed four ounces every four hours. Hot colonic flushes should be used several times a day, aided by calomel, gr. 1-6, every hour for six doses and followed by small doses of saline laxative every two hours, enough to keep the feces fluid but not to excite painful peristalsis. Meanwhile the patient is to be brought quickly under the full influence of hyoscyamine, gr. 1-250, every hour till the face flushes, and this effect to be maintained by a similar dose whenever the flush begins to fade. Give calx sulphurata, a grain every hour until saturation, to inhibit microbic activity and prevent or limit suppuration. The use of enemas demands skill and judgment on the part of the nurse—it is not necessary to risk rupturing the bowel by undue violence.

Cold applications over the affected region are usually advised, but many find more relief from very hot ones. Mere counterirritation is probably useless.

During convalescence care must be taken to prevent harm by indiscreet exertion or improper food. The bowels must be kept free from fecal collections and from fermentation or microbic virulence. The intestinal antiseptics should be employed persistently as long as there remains a region of low resistance that could be infected. Possibly the sulphophenolate of copper may prove of exceptional value here, or copper arsenite in doses of gr. 1-100 four times a day. These are worthy of more extended trial.



## INTESTINAL OBSTRUCTION

The forms of intestinal obstruction may be divided into the acute and the chronic. In the first group are comprised strangulation, intussusception and volvulus. Strangulation may be caused by bands remaining from a local peritonitis, most common about the ileocecal valve. Obstruction by adhesions is seen after abdominal sections, from Meckel's diverticulum, the remains of the obliterated omphalo-mesenteric vessels, or the appendix. Internal strangulation or hernia may follow the inclusion of a knuckle of bowel in Winslow's foramen, or various slits and openings in the peritoneal folds. Diaphragmatic hernias occur congenitally and from traumatism. Strangulation is most frequent in young males.

Intussusception is the telescoping of part of the bowel in another part. This is most common at the ileocecal valve, the small bowel entering the cecum. Three layers of bowel thus come together. If the protrusion invades the rectum it may be felt on examination with the finger. There follows inflammation, with swelling, and the mass may be strangulated at the point of entrance and necrosis result. The slough may pass by the anus or perforation may occur. This malady is most frequent in children under 10, and in males. It may follow circular enterorrhaphy or lateral plate anastomosis.

Volvulus is most frequent at the sigmoid flexure. There may be a long loose mesentery, or a local infiltration of a portion of the bowel that stops its peristalsis while that of the next segment continues. Men over 40 years are most subject.

The chronic obstructions are due to fecal impaction, tumors, cicatricial or congenital stricture, and peristaltic paresis. Impactions are most common in the cecum and sigmoid flexure. They may occur in childhood but are more frequent in adult women. Hysteria, hypochondria or dementia may attend, and the degree to which these and other psychic maladies may be ascribed to the obstipation is a nice question. The colon may be dilated congenitally or later. The fecal masses may be channeled or encysted in pockets of the gut, allowing tolerably regular passages. The condition of the mucosa when these masses have lain long in contact with it cannot but be unhealthy, and the poisoned bowel easily falls into the destructive forms of inflammation. Ulceration and perforation are common. If the opening is suddenly closed symptoms of acute obstruction ensue.

Enteroliths are hardened concretions, gallstones, lime and magnesia phosphates, foreign bodies, food derivatives, etc. The writer has known

tal obstruction to be caused by masses of charcoal and magnesia. The huge doses of iron sulphate given in Blaud's pills have been known to leave deposits of ferrous sulphide which occasioned local disease. Foreign bodies may lodge anywhere in the small bowel but more frequently stop at the ileocecal valve. Bismuth and salol may be given in quantities sufficient to form obstructions.

Tumors may develop as neoplasms in the walls of the intestine or impinge on its lumen from without. Carcinoma is frequent, circumscribed and annular, or as a diffuse infiltration beginning in the mucous membrane or its glands. The sigmoid flexure is the most frequent site, or the rectum. The connected lymphatic glands are secondarily affected. The disease may be secondary to ulcer or long-continued catarrhal disease. Sarcoma is most common in the small bowel, beginning beneath the mucosa. It may occur in children. The glands are also affected. Benign tumors, of the bowel or the omentum, and pelvic adhesions, may cause obstruction.

The healing of intestinal ulcers present in chronic diarrhea or dysentery may cause cicatricial stricture, which permits the passage of only a definite and decreasing quantity of material. Rectal strictures are often syphilitic. Congenital strictures are rare—usually anal atresia.

Peristaltic palsy may be due to inflammation, enteritis or peritonitis, to fecal or flatulent distention, or it may follow abdominal operations. The bowel continues to dilate, the walls becoming hypertrophied above the obstruction and contracted below it. The tissues in contact with the obstruction are inflamed and this may extend to the peritoneum. Consequences may be the formation of a false membrane, gangrene, ulceration, perforation, and local or general peritonitis, with all its dire symptoms.

**Symptoms:**—In acute cases there are suddenly developing abdominal pains, perhaps following exertion or strain. The pain may become unbearable, with exacerbations. Vomiting soon follows and the constipation is absolute. Hiccough and eructations occur if the obstruction is high up in the small bowel. The early symptoms are rather of strangulation than of obstruction of the bowel. Tympanites appears later, most marked in colonic obstructions. The pain is of the agonizing nature peculiar to tissue strangulation. The vomiting increases in severity and constancy, alternated with retching. The contents of the stomach are voided, then mucus, bile, and finally fecal material. Rapid and profound collapse develops quickly, with cold nose and extremities, small weak pulse, pinched face, cold perspiration and profound depression of the vital forces.



The temperature is subnormal, respiration shallow and fast, the expression that of anxiety, the urine scanty, and thirst excessive. The abdomen is swollen, tympanitic and very tender. Excited motion of the bowel may be seen above the obstruction, gurgling and splashing heard on auscultation.

In chronic obstruction the symptoms of the cause will be presented. The obstruction is not complete, but increases gradually, as denoted by increasing constipation. Diarrhea may be excited, with colic and increasing tympanites, vomiting and prostration. Complete obstruction may occur suddenly or gradually supervene. If the bowel is compressed from without, the stools are flat, ribbon-like, while if the stricture is uniform they are like pipe-stems. If the obstruction is in the small bowel, whose contents are fluid, there may be little or no constipation. Sometimes a tight stricture here is obstructed by a morsel of food, and vomiting will continue until the offending substance has been ejected. The rectum may be distended by fecal masses in young infants or in the aged.

In cancerous cases we have the cachexia and progressive loss of weight and strength. Inspection shows distention above the obstructed point with excited motion. Palpation may detect a growth.

**Diagnosis:**—Sudden, severe increasing abdominal pain, persistent vomiting becoming stercoraceous, complete constipation with tympanites, with deep and early depression, indicate acute obstruction. The location may be inferred from the character of the vomiting, which is only fecal when the large bowel is obstructed. The distension is less when the small bowel is obstructed, and there is less tenesmus. Mucus and blood indicate irritation of the large bowel. Palpation may locate a tumor or stricture. If the upper small bowel is alone obstructed, indol and phenol are absorbed, and indican appears in the urine, which is not apt to be the case when the large bowel is obstructed. Examination by the rectum or vagina may give valuable information, as also will distention of the bowel by water or gas thrown into the rectum.

In strangulation we have a history of peritonitis, abdominal operation, or recurrent attacks of abdominal pain, with early fecal vomiting, mostly in young men. Intussusception occurs suddenly in a child with colicky pain, tenesmus, mucous and bloody stools, and a sausage-like tumor, while the constipation is not absolute, nor the tympanites marked. Volvulus occurs in the aged following intestinal atony, constipation, flatulence or local inflammation. Tympanites is marked, with abdominal rigidity, dyspnea and local tenderness. Fecal obstruction follows obstinate constipation and the onset is gradual. There is not much tympanites, and vomiting only occurs late if at all. Palpation may detect

fecal masses which may even pit on pressure. Sometimes there has been a gradual enlargement of a part of the abdomen. The tenderness is slight. Obstruction from gall-stones or other intestinal contents such as foreign bodies may be surmised from the history, but are otherwise difficult of positive diagnosis. In the chronic forms we have the history of chronic diarrhea with ulceration, tuberculosis, carcinoma, sarcoma or other disease. Intestinal paresis follows enteritis, peritonitis or abdominal operation. Peristalsis cannot be perceived, and tympanites is general. Peritonitis may be distinguished by the history, early and high fever, peculiar radiating pain, vomiting not fecal, late collapse and leucocytosis in septic cases. The abdomen is generally and markedly distended, peristalsis invisible, tenderness decided and general, the sounds on auscultation not prominent, and effusion follows. In acute enteritis we have diarrhea with mucus and bloody stools, fever and intense pain, the stomach being usually most affected by corrosives. Abdominal colics differ widely in the history, previous to and during the attack.

Acute obstructions end within a week; the chronic may run for months. The prognosis is bad in all. Complications are peritonitis, gangrene, sepsis and enteritis.

**Treatment:**—Fecal impactions are best broken up by coal oil enemas; from one to four pints may be injected as far up the bowel as possible and after one hour may be washed away by copious warm enemas. This may be repeated according to the indications. Intussusception and volvulus may be relieved by distending the bowel with hot water or with air, care being taken not to cause rupture by overdistension. Abdominal massage with hot camphor liniment is also a valuable resource. As some forms of obstruction are due in part to spasmotic contraction it is always advisable to bring the patient rapidly under the influence of hyoscyamine, which is far superior to morphine in this instance. When there is a mechanical obstruction, like stricture or occlusion by a foreign body, or when cancer or other tumors occasion the trouble, surgical intervention alone is indicated. Anders says that acute forms require surgery, but clinicians see too many cases in which the peril appears imminent, and yet recovery ensues when the patient is brought fully under hyoscyamine, and enemas bring to light incredible quantities of seeds, cherry stones, half masticated peanuts, or other food residues, to be stampeded by such statements. Tympanites has been relieved by withdrawing the gas by means of a very fine trocar and canula. When time permits physostigmine relieves this symptom. Constipation and intestinal atony are discussed elsewhere.



## CARCINOMA OF THE INTESTINE

This is a common cause of chronic intestinal obstruction. The stenosis gradually increases until there is a breaking-down of the cancerous masses, when this symptom is relieved. The malady is usually secondary.

The most common form is cylindrical epithelioma, although scirrhus, medullary and colloid forms may occur. It may be annular, polypoid or an infiltration. The abdominal glands are affected later. It is most frequent in the rectum, then in the sigmoid flexure, transverse and descending colon, duodenal papilla, ascending colon, and the lower and middle ileum. Above the obstruction the bowel is dilated and hypertrophied, fecal matter collecting there. Below the tumor the bowel is contracted and atrophied.

The causes are those of cancer; old age and intestinal ulceration are the principal features.

**Symptoms:**—The patient complains of shooting pains and increasing distress at first following defecation, but becoming more constant. Diarrhea alternates with constipation. The feces contain blood and mucus. Cachexia develops, there is a little fever, the patient steadily loses weight and strength and an anxious expression becomes fixed. The anal sphincter may be paralyzed, and incontinence result. Sometimes there is absolutely no symptom excepting constipation, that is controlled by constant care, until the obstruction becomes practically complete. There may be even not enough cachexia and autotoxemia manifest to attract attention, although quarts of fecal matter are retained. Colicky attacks however, are apt to occur, with abdominal uneasiness and flatulence. If the cancer is in the large bowel, the shape of fecal masses may be altered.

A tumor may be noted on inspection, with peristalsis above it and quiet below, or the mass may be outlined by palpation, and dullness elicited by percussion. Boas' sign is the sudden appearance of small coils of bowel, vanishing quickly and reappearing.

The diagnosis may be made by the age, cachexia, pains, bloody stools, the firm nodular tumor, persistent and not movable, with pigmented skin, small angiomas and capillary hemorrhages. Most of these symptoms occur singly with other maladies. The location may be fixed by distending the bowel.

The course varies with the variety, soft cancer destroying life in a few months, the hardest ending within three years. Death may be due to perforation and peritonitis, rupture from overdilatation, extension, ulceration and sepsis. The prognosis could scarcely be worse.

The treatment is surgical, and by this means life may be prolonged. A question to be decided is whether conduragin, which has notably succeeded with cancer of the stomach, would succeed if applied locally to rectal cases where the tumor is within reach. The writer has employed this agent in one case of rectal cancer, rather imperfectly, as the treatment was carried out at the patient's home by an inexperienced nurse. Nevertheless the patient was firm in his belief that the remedy greatly relieved him and prolonged his life. Much of the suffering is removed by any measure which will insure the patients against fecal collection. In this case a milligram of conduragin was dissolved in a dram of warm water and a pledget of cotton saturated with this solution, placed in contact with the tumor after cleansing by copious enemas.

When colotomy has been performed and the fecal stream diverted from the cancerous rectum, not only has the relief been great, but the progress of the cancer seems to be markedly delayed.

## CONSTIPATION

**Etiology:**—There may be a deficiency either in the fluidity of the intestinal contents or of the sensory irritability and peristaltic power, or both. Among the general causes may be mentioned the sluggish temperament disposing the patient to muscular inactivity, the habits of a sedentary life and the neglect of that regularity which is absolutely necessary to the healthy exercise of the function; general debility and that due to chronic disease; the use of concentrated foods with little residue; the use of too little water or that which has a constipating quality, and the loss of excessive quantities of water through the kidneys and the skin. Among local causes may be mentioned, atony of the abdominal muscles from obesity or following parturition; atony of the large bowel from chronic catarrh and habitual distention; pressure from without as from a retroverted uterus; intestinal stenosis from internal causes, and continuous muscular contraction, such as occurs in lead poisoning.

**Symptoms:**—The term constipation is relative, for while one person may require two movements a day, another may enjoy comparative health with one a week. In general it may be said that constipation is a disease when the patient experiences any evident symptoms from it. These symptoms may be direct, such as the sense of fullness, weight or pressure in the abdomen, flatulence, colic and the irritation expressed by diarrhea. The general symptoms are those now comprehended under the term "fecal autotoxemia," decomposition going on in the retained substances, and the toxic results being absorbed in the blood.



These are carried to every part of the body, exerting on all a deleterious influence. The effect will be manifested at the points of lowest vital resistance. Hence we may have the so-called reflex symptoms appearing anywhere in the body. These may be somatic or psychic. Among the more common are a sense of malaise, dullness, irritability, headache, flushes, palpitation, cold feet, loss of appetite, vertigo, insomnia, disturbed sleep and bad dreams, innumerable paresthesiae, neuralgias, various skin eruptions, disorder of the liver, kidneys or other organs, uterine affections, aggravation of mucous catarrhs and the appearance of small foci of suppuration in the skin especially. The digestive function is invariably affected. Fever may be present, and in fact a continued fever may be excited resembling typhoid fever, and with difficulty distinguished from it. The liver is early intoxicated, and as a result we have disturbed digestion and portal obstruction with gastroenteritis and hemorrhoids. Local disease of the intestinal walls is induced.

The diagnosis is easy enough, although it is difficult even for experienced practitioners to realize how completely a grave case of fever even unquestioned mental derangement may depend upon constipation. The prognosis is good. Nothing will excuse the neglect of hygiene.

The patient must be taught to eat the proper food in the proper manner. Fruit and such articles as contain an irritating indigestible residuum should be employed. Among those we mention oatmeal, cornmeal and flour from the entire wheat; raw prunes, figs and dates are excellent if thoroughly masticated. A sufficiency of bodily exercise is imperative, and such exercise as affects the abdominal muscles is essential. Perhaps nothing equals the use of a buck-saw. Sufficient water should be used, and it is good practice for the patient to drink a pint of cold water immediately on rising. Cascara and aloin are the two remedies believed to act specially on the musculature of the large bowel. The writer has for many years employed a combination of aloin, strychnine, atropine, emetine and oleoresin of capsicum, to which recently a trace of bilein is added, with the best results. This he believes to be the best means of obtaining a cure.

If the treatment of constipation consisted simply in the administration of a cathartic, or of a succession of cathartics, there would be little need of writing on the subject. The long list of laxatives, drastics, hydragogues, etc., from bran to elaterium, would seem to cover every possible case requiring evacuation of the bowels.

But cathartics do not cure constipation. In fact, they only make it worse, by lessening the natural power of the bowel and getting the

patient into the habit of depending on outside aid to force his rectum to perform its functions. It is well known that, when once this dependence upon drugs is formed, larger and larger doses are required, until the victim is finally unable to have a passage without the aid of a boxful of patent pills, or the most powerful of the cathartic group in enormous doses. It is this principle that has made the fortunes of the patent-pill-venders, whose advertisements are never absent from the papers. The injury done by these men, in making chronic drug-takers of their patrons, is great.

The same condemnation must be made of the laxative waters, foods, suppositories of gluten or glycerin and enemas small or large. Not one of them cures; all must be classed as of that vicious group of palliatives that confirm the original disease.

And this disease is a diminution of the sensibility of the colon and rectum, by which these organs retain the feces and become distended by them, instead of being excited by their presence to expulsive contraction. The prime cause of this loss of sensibility is neglect. The presence of feces is noted, but as it does not suit the individual to go just then, the duty is put off until the pressure is imperative.

Meanwhile the bowel is becoming accustomed to the presence of feces and is gradually becoming transformed into a cavity for storing the same, instead of an organ for their expulsion. As the muscular movements grow weaker, the bowel may be dilated until very large quantities may be stored in it. Reynolds relates a case in which a woman had her bowels opened but four times a year, taking a breakfast cup of pills for that purpose and filling a wooden bucket with masses as large as a baby's head at birth.

Women are the greatest delinquents in this respect. It is exceedingly rare to find one who performs the duty of going regularly to the closet every day at the same hour. In twenty-five years of practice I can recollect but one who did this. And yet it seems strange that the beauty-specialists have not yet found out that the daily evacuation and the morning cold bath, with open air exercise, are worth all the cosmetics, paints, powders, pastes, frictions, massage, etc., which they vaunt so loudly, for the female complexion. But I may be wrong—they doubtless *have* discovered it, but these agencies cannot be peddled about at \$2.00 a bottle.

No cosmetic can remedy the muddy, pimply, blotchy complexion; no tonic restore the look of health to the woman who is constantly absorbing into her blood, from her alimentary canal, the liquid portion of her feces.



The indications for treatment are very simple: To open the bowels and keep them open daily by as little help as is necessary, until the influence of habit has restored the organs to their normal functions. The hour most suitable in each case should be selected, and the patient enjoined to go to the closet daily at that time. The more precisely the time is fixed, the greater the likelihood of the direction being obeyed. To insure the action we know no remedy as efficient as the laxative granule.

The effect of the ingredients is as follows: Aloes stimulates the peristaltic action, especially affecting the muscular fibers of the rectum. The dose of aloes should never exceed one grain (or of aloin one half grain). Large doses do harm and do not give the tonic action sought, but exhaust the irritability by over-stimulation.

Strychnine promptly increases the peristaltic action, and also the sensitiveness of the mucous membrane, thus rendering it less tolerant of its contents and affording more power to throw it off.

Atropine lessens the tendency of these drugs to cause griping, while it favors their laxative action by paralyzing the terminal ends of the splanchnic inhibitory nerves. As it lessens secretion, the addition of a minute amount of emetine is advisable, especially when the stools are already abnormally dry or costive. As this condition most frequently results from the too free use of very cold water, patients should be cautioned against the use of iced water, ices, and ice cream.

The last ingredient is capsicum, added to stimulate secretion and increase the sensibility of the mucous membranes. This is one of the most important ingredients, as I have never been able to get as good results from the others when the capsicum has been omitted.

Sufficient of these laxative granules are to be given to insure one passage daily. This dose must be divided into three portions, one to be taken before each meal. In a few days it will be found that the dose can be diminished somewhat; and, as the bowels become stronger and the habit of regularity is established, the number of granules is gradually lessened until but one is necessary. Then one is to be taken twice a day, then once; but this last granule should not be dropped for a long time. The moral effect of it is similar to that of a "buckeye" carried in the pocket. Indeed, it would be well to give the patient a box of dummy pills, placebos, to take after the need of real laxatives has passed away, so strongly is the connection between pill and passage fixed in his mind.

What these granules will do is to cure chronic constipation, if the rules as to taking them and as to regularity be observed. They will not cure if these rules be neglected.

They will not cure obstruction due to stricture, torsion, pressure from outside the bowel, or occlusion of the gut by a foreign body.

They will not remove an impaction of feces. Their function is to prevent the reforming of such a collection after it has been removed by enemas or by active cathartics.

They are not so well suited for the obstinate constipation of paretics ("softening of the brain") as the cold, saturated, salt-solution enema.

The formula of this combination is as follows: Aloin, gr. 1-25; strychnine sulphate, gr. 1-500; atropine sulphate, 1-2500; oleoresin capsicum, gr. 1-500; emetine, gr. 1-500.

### DILATATION OF THE COLON

The entire colon may be dilated or any part, acutely, more frequently chronically. This may be the part above a constriction, or one part being dilated that below it is relatively narrowed and feces collect in the relaxed portion. Enormous dilatation and huge masses of feces may be found, even distorting the shape of the abdomen. The bowel may be thickened, hypertrophied, ulcerated or catarrhal. While constipation is present there may be small, insufficient passages daily.

The diagnosis may be made by inspection and palpation, distending the bowel with gas or water, and sometimes by percussion.

The fecal masses are best broken up and evacuated by enemas of kerosene, followed by large colonic flushes of warm water, and continued administration of salines. When all retained feces have been removed the dilated bowel may be contracted by the use of strychnine, physostigmine or berberine, alone or alternated, each given to full effect and this sustained. We usually give each of these for a week in succession. Meanwhile the diet should be irritant in quality and small in bulk, the dilated bowel being never permitted distention. Internal faradism is useful, the negative pole applied to the fluid in the colon through an electrode insulated to near the tip. Cascara acts specifically on the large bowel, and doses exactly enough and no more to keep the bowel regular may be given after the cure to prevent return. Or, the laxative granule mentioned in the chapter on constipation may be employed; with a granule of physostigmine and gr. 1-6 of berberine, to three or five of the laxatives, at each meal. Pains must be taken to see that no reaccumulation is permitted and that the cathartic habit is not formed on the other hand.

Mechanical obstacles like strictures are only to be relieved by surgical measures.



## MUCOUS COLITIS

This disease is much more common than most physicians imagine. While its severe and typical forms, which are mainly described in the text-books, may not be so very common, there certainly are very many cases of a milder type which entirely escape diagnosis, and in which frequent attacks of colicky pain and diarrhea are ascribed to a variety of other causes, such as simple intestinal colic, inflammatory colitis, acute indigestion, gastralgia, ovarian colic, gallstone colic, and appendicitis. And yet the diagnosis is not as a rule very difficult—though the differentiation from true inflammatory colitis is not always as simple as we might desire.

**Etiology:**—There is great difference of opinion among authorities as to the nature of membranous catarrh of the intestine. There are two schools: One regards it as a secretory neurosis, with no inflammatory basis; the other, while admitting the nervous factor, ascribes its symptomatology partially at least to inflammatory changes in the mucous membrane of the intestine. The former, as led by Von Noorden, is now the dominant school. And yet it is universally admitted that in a variety of inflammatory diseases of the intestine there is a nosologic picture which clinically is indistinguishable from non-inflammatory catarrh, the colica mucosa of Von Noorden. Recent French writers have especially emphasized this relationship and have classified and described a series of symptom-pictures which in many respects parallel the true secretory neurosis. They have shown that there is a group of true intermediary forms which serve to bind together the more pronounced and unmistakable colon inflammations and true colica mucosa. "Is there," say Mathieu and Roux, "identity of nature between mucomembranous colitis, properly so called, and colitis with mucous hypersecretion? The existence of intermediary forms may be invoked in favor of the unity; but in reality we can make on this subject but gratuitous hypotheses." The subject is one capable of prolonged discussion, which we have not room for here. But after some consideration of the question, it seems to me that pure neurotic forms of colitis rest at one end of a scale, pure inflammatory forms at the other, and that there may be a number of intermediate forms, many of which undoubtedly present slight inflammatory complications, while other forms are perhaps inflammatory in their inception, even though this factor has since ceased to play a part.

Mucomembranous colitis occurs mainly in women and almost invariably in those of a neurotic type. It is on this nervous instability that

it mainly depends, in the same way as the neuroses of the stomach. Indeed, with this intestinal hypersecretion we have, in many cases, a history of gastric hypersecretion or hyperchlorhydria. This has been noted almost without exception in the few cases I have observed; the hyperchlorhydria was very marked for a year or two preceding the inception of the intestinal trouble in one case to which I have called especial attention. The neurotic factor is so important that it deserves special investigation in every suspected case of this kind. As bearing upon this point the gastric hysteric stigmata referred to by Mathieu and Roux have frequently been observed by me, and will certainly be found present in a large percentage of cases. These are (1) marked hyperesthesia or sensitiveness to pressure in the gastric region; pressure in this region causing a peculiar sickening pain, varying greatly in intensity, this being due to hyperesthesia of the solar plexus and the chain of sympathetics lying along the abdominal aorta; (2) the presence of areas of increased or diminished sensibility in the skin of the abdomen. These hysteric stigmata I have observed in some of these cases of colica mucosa, and I believe they throw some light upon its causation.

Neurasthenia, the exhaustion neurosis, is also present in a very large percentage of cases, though it is not always easy to demonstrate its existence prior to the development of the intestinal trouble. Thus, in 304 cases investigated by de Langenhagen, in only sixteen had the neurasthenia preceded the intestinal disorder. Nevertheless the neurotic relationship cannot be evaded; there is undoubtedly a neurotic soil, whether hysteric or neuralgic, in most of the cases of this disease. As Caley says in a recent number of the *British Medical Journal*: "It seems as if we can hardly evade the vicious circle; neurasthenia predisposes to colitis and colitis induces or aggravates the neurasthenia."

Attention has recently been called to the relation of arthritism to membranous colitis, and de Langenhagen makes the flat-footed statement that "the arthritic diathesis is found at the origin of every mucomembranous enteritis." This has not struck me in the few cases I have seen, but is worthy of investigation, inasmuch as Caley says, the relationship seems to be rather "with the chronic and fibrous forms of articular and muscular rheumatism (fibrositis) than with acute rheumatism." Since there are excellent reasons for belief that many of the so-called rheumatic cases of this description are consequent upon and due to intestinal autointoxication, is it not possible that this arthritic condition is due to, rather than the cause of, the bowel disturbance, a condition notoriously likely to favor the production of intestinal poisons? The relation of neurasthenic troubles to antointoxication is undoubted.



One point that has particularly interested me has been the frequency with which the patients suffering from colica mucosa presented visceral prolapse, splanchnoptosia, in varying degree. Whether relaxation is due to a common cause, the neurotic weakness and lack of tone, or whether there is a true anatomic relationship, the result being interference with nutrition of the bowel through choking of the vascular supply, is an interesting question.

One symptom which is constant in these cases also undoubtedly acts as an exciting cause: the constipation. This is always present and probably always precedes the paroxysmal attacks.

We may assume that the pathogenesis is about as follows: (1) A condition of general reflex irritability, due to the neurotic condition; (2) a localized irritability of the intestine, with or without superficial irritation or true inflammation—possibly and even probably a sub-inflammatory state in many cases; (3) localized or general spasm of the colon, this being the cause of the constipation, which, whatever its inception, sooner or later becomes spasmodic in type. These give us the indications for treatment.

**Symptoms:**—There are three important symptoms, and these for all practical purposes are always present. These are: constipation; the presence of mucus in the stools; and paroxysmal pain.

The *constipation* is not always recognized, simply because in many of these cases, perhaps in most of them, there are frequent attacks of diarrhea, usually though not always accompanied by the characteristic pain. But in spite of the diarrhea there is invariably more or less fecal stasis and an accumulation of fecal matter, which is rarely if ever entirely removed. The stools are variable. In many cases they are the characteristic ribbon or pencil stools of spasmodic constipation; in others the patient passes rounded hardened scybalae, the so called "sheep-dung stool"; another form which I have observed, usually alternating with one of the others, is a formless stool consisting of an admixture of mucus with fecal matter, having the appearance of brown sugar; upon stirring it entirely disintegrates, the mucus floating on the water. At times the patient's stools will be apparently normal in appearance but there is a tendency for the above described forms to reappear at every fresh access of the affection.

*Mucus* is invariably present in every case though not in every stool. It is clear and there is no admixture with blood, as in the case of the true inflammations, proctitis or sigmoiditis. If blood is present the presumption is that we have a true colitis, not a neurotic hypersecretion. The quantity of the mucus varies greatly; usually with severe paroxysms of pain if the quantity is large. According to Von Noorden the pain is due to the fact that the mucus adheres very closely to the bowel wall, and

being detached with great difficulty severe spasmodic action is the result at every stool. The form in which it is voided varies greatly. Usually it appears as tough strings of mucus, more rarely in partial casts of the bowel. In one case the patient called my attention to the strings of mucus which were five or six inches in length, because she thought she was passing a tape worm or some other intestinal parasite. The strings are often very tenacious. At other times, as in the loose flocculent stool which I have described, the mucus will be intimately mixed with the fecal matter. Such a stool, when stirred a little, will often be found to consist very largely of pure mucus.

The attacks of *pain* usually accompany movement of the bowel or attacks of diarrhea. It is sudden in its onset and paroxysmal in its character. It is usually very severe, accompanied by a sickening sense of faintness; at times the patient may even lose consciousness, though this is not common. After the attack of diarrhea subsides the pain usually disappears, though the patient usually experiences a sense of weakness or depression following such an attack. At other times there may be a succession of diarrheal attacks, covering a period of several hours or even days, and the pain is more or less continuous during that time. The severity of the pain, as Von Noorden declares, seems to be proportionate to the quantity and tenacity of the mucus, and this again seems to depend upon the degree of constipation.

**Treatment:**—The principal indications for treatment are about as follows:

1. To cure the constipation and prevent its recurrence.
2. To correct any local irritability of the bowel, which by response to stimulus seems to excite spasm and increase constipation and pain.
3. To restore the normal tone to the nervous system, and while doing this to increase the nutrition of the body.

The method of treatment advocated by Von Noorden addresses itself almost entirely to the cure of the constipation. While recognizing the importance of treating the nervous system he says: "If it is found impossible to treat the patient in all directions the chief attention should be given to the intestine, for regulation of the bowels invariably leads to a rapid cure of any case of colica mucosa."

The treatment of this disease advised by all authors is mainly dietetic, but in outlining a regime there is a wide divergence of opinion. The methods of Von Noorden are those most popular in Germany and in this country—and deservedly so. Since he believes that the constipation is fundamental and ascribes practically no importance to the local condition of the bowel he advocates giving a diet which aims only at one thing—it must be generally laxative. He therefore advocates food that is very



coarse, and that contains a large proportion of indigestible residue. He orders Graham bread, 250 Gm. or more a day, and in addition as great a variety as possible of leguminous foods, including their husks, vegetables containing much cellulose, fruit with small seeds and thick skins, besides large quantities of fat. The stools after such a diet are large, and surprisingly soft and non-irritating.

The older method of dieting, and that still mainly advocated by French authors, prescribes a diet which is primarily intended to be non-irritating. As one recent writer puts it: "The food should be (1) rich in nitrogen, carbohydrates and fats to assure a well balanced ration; (2) comprise only foods which bring into exercise as slightly as possible the motor function of the intestine; (3) be composed only of fresh materials." These authors prescribe mainly farinaceous foods in the form of purees, gruels, etc; all the coarser elements being carefully excluded.

There can be no doubt that the methods advocated by Von Noorden are vastly superior and are applicable in the vast majority of cases. I have found some difficulty with the very coarse diet, however, in some cases, due probably to faulty technic, since these were home-treated cases and a rigid diet was not easily secured. In such cases I have however, had good success by adding a large amount of fat to the regular diet, usually in the form of cream, which was ordered at and between the regular meals, in much the same way as the milk diet is prescribed in the modern treatment of consumption. The great difficulty I have experienced is to persuade these patients to take enough food. Most of them are dainty feeders, of small appetite and accustomed to living largely on toast, tea and such things. Increase the amount of food, for if you can "fat up" almost any neurasthenic she will show improvement.

The ordinary laxatives are likely to do more harm than good in colica mucosa. We are dealing here in most cases with a spasmodic constipation. The common laxatives increase this spasm and only cause evacuation at the expense of the bowel, with increase of pain and increase of mucous irritation. Probably the best method to unload the bowel during an acute attack is by warm enemas—not hot nor cold, since warmth is relaxing while either extreme heat or cold is stimulating. This should be introduced gradually, without pressure—just allowed to run in. The addition of a little salt or soda helps to detach the adherent mucus. The oil cure of Kussmaul admirably meets the indication in most cases. From four to eight ounces of olive oil are injected into the bowel at bedtime and retained if possible through the night. It may be well to precede the oil by the water enema as just described, to unload the lower bowel. The oil serves to soften the hard feces which may be and usually are retained.

During acute attacks relief of pain may be secured with hot applications to the bowel and unloading the intestine by the means just described. In addition most authors advise recourse to morphine or opium. While these narcotics may occasionally be required by the intensity of the pain, in the majority of cases better and every way more satisfactory results may be obtained with atropine. This has the advantage of being not only narcotic but it relaxes spasms and diminishes reflex irritability, thereby meeting the second indication perhaps better than any other remedy. During acute attacks atropine should be given to physiological action, shown by dryness of the throat and mouth; rarely is it necessary to push it to the point of reddening the skin and dilating the pupil. I also believe that atropine is the internal remedy of most value for continuous use, to diminish the irritability of the intestine. But for prolonged use it should be given in very small doses, 1-1000 of a grain three or four times a day; possibly twice this dose may be necessary or desirable in some cases, but usually in these doses it has a decidedly soothing effect, and by checking the response to slight irritation it tends to relieve both spasm and constipation. In this sense atropine is certainly a valuable laxative, perhaps the most valuable we have in spasmodic constipation, a condition in which only the slightest peripheral or central irritation is sufficient to cause temporary closure of the lumen of the bowel. Morphine and opium, while normally checking secretion and peristalsis, have a similar effect and upon occasion may be useful as laxatives, and to relax spasm generally, but the objection to the use of morphine continuously is too apparent to need comment. Another advantage of atropine thus used in these cases is its influence on the secretory function of the digestive tract. As we have already pointed out there is in these cases hypersecretion, not in the intestine only but throughout the digestive tract, the stomach especially; the action of atropine in small doses can therefore hardly fail to be beneficent.

Is the local condition such as to require local medication? Von Noorden and the others of his school say no, and in general we may agree with them. But in many cases an effort toward local medication certainly seems advisable, at least to remove sources of irritation such as the irritant toxins developed in fecal matter. Theoretically the sulphocarbolates would seem indicated to check putrefactive processes, which are certainly present in these cases and besides their local action must contribute to the general state of innutrition. But I have found these salts irritant in these cases—poorly tolerated. Copper arsenite, on the contrary, seems to have a good effect and is both tonic and sedative to the mucosa. It deserves further trial. Arbutin which exerts so marked an influence in restoring the normal conditions to catarrhal or relaxed genito-urinary mucous



membrane, has a similar but less marked control over the intestinal mucosa. It is possible that in rhus tox we have a similar agent whose influence is most particularly exerted over the bowel, and many observers have testified to this. This is as yet, however, in the stage of experiment, with indications favoring the claim.

In one case of many years standing one of my colleagues has obtained considerable benefit from colonic flushing with warm water impregnated with volatile oils, repeated daily for a month or more. A valuable sedative in all nervous diseases, acting through the central nervous system, is cicutine hydrobromide. While a powerful sedative it is not a habit forming drug and may be taken with perfect safety and with undoubted satisfaction.

While removal of the exciting cause, the constipation, undoubtedly serves to eliminate the symptom-complex which we are describing, to insure the permanency of the cure and restore the patient to normal health it is necessary to treat the underlying condition—the neurosis. This is, in the main, a matter of improvement of digestion and assimilation: for, as I have said before, if you can make one of these patients fat—and by this I mean not flabbily fat, but a genuine increase in the essential tissues of the body—you have cured her. The dietetic measures addressed to the constipation are therefore at the same time beneficial to the nervous state. Plenty of food, food which can be digested and assimilated, this is fundamental. But since the digestion of these patients is often feeble this may require medicinal aid. In the case to which I have previously referred the best results were obtained with a cream diet, giving at the same time pancreatin and the bile acids. In this case gastric digestion was fairly good, indeed there was an excess of HCl, but intestinal digestion seemed to be poor and the depurating action of the liver feeble. Any medication of this kind must meet the special condition. However, I have a feeling that the condition of the liver is too often neglected in these cases. Sometimes, as in the lenteric diarrhea preceding rickets, there is evident indigestion of starches, and the addition of diastase in full dose prove an efficient adjuvant.

These patients are often anemic and in such cases arsenic seems to act better than other medicaments. I have found no remedy more generally useful in neurasthenics, whatever the line of symptomatology, than strychnine arsenate. Similar salts of iron and quinine may be added, and there are many testimonies to the value of nuclein in these cases. The tonic and reconstructive properties of arsenic and strychnine are particularly desirable in lifting the patient into a condition where the normal process of the body will be taken up and carried on naturally.

There is a current belief that strychnine is objectionable in spasmodic affections because in large doses it produces muscular spasm. This is a mistaken view. In spasmodic affections generally there is defective tone, not over tonus, as seems to be the idea; in other words the nervous system, being in a weakened and irritable condition, responds too readily to stimuli—because it is weak. Anything which serves to add tone and strengthen the control exerted by the nerve centers, minimizes the tendency to spasm; therefore strychnine meets an important indication. But it should be given in small or tonic dosage, never in the large doses recommended in certain extreme cases where the full physiological action of the drug is required.

Of course any intercurrent malady should be corrected. If there is splanchnoptosis, a suitable support should be worn and pelvic diseases, so common in these women, should receive suitable treatment. But these things I cannot well now discuss.

## ENTERALGIA

**Enteralgia:**—Intestinal neuralgia may occur in the neurotic—hysterical, hypochondriac, neurasthenic, cachectic or debilitated. Possibly it may be reflex, but the domain of this is being largely restricted by the recognition of autotoxemia as a cause of many maladies formerly interpreted as reflex irritations. Spasm of portions of the bowel may be excited by the presence of foreign bodies or fecal concretions, parasites, or gas. Many cases believed to be intestinal colic are really due to gallstones. Lead colic must not be overlooked.

Flatulence often precedes the occurrence of colic, which supervenes rapidly. The pain is severe, local or general, relieved by pressure, and may be excruciating. The most intense abdominal suffering is that due to the presence of large quantities of acid in the stomach and bowels. In hypogastric neuralgia the hemorrhoidal plexus is affected, as may occur with ataxia, hemorrhoids, or in female neuroses. The pain radiates to the sacrum, thighs and perineum, with distressing irritation of the bladder and rectum.

The diagnosis is oftenest guessed at, but the relief from pressure or on evacuating gas, the absence of fever and evidences of local disease, the paroxysmal character, and relief following the use of relaxants, should suffice. Jaundice with itching skin, and hematuria, distinguish hepatic and renal calculi. Myalgia of the abdominal muscles is common and may be distinguished by the milder pain and the suffering felt when the affected muscle is put in contraction by faradism.



Acids are quickly neutralized and the pain relieved by a teaspoonful of baking soda in a glass of hot water; or by a few grains of calx iodata. Spasmodic pain subsides under hyoscyamine and glonoin, gr. 1-250 each every five minutes, dissolved in hot water and allowed to be absorbed from the mouth, or given hypodermically. This prescription is improved by adding strychnine, gr. 1-134 to each dose, which aids in restoring the control of the nervous system over the spasmodic fibers.

Any carminative, any mixture hot enough to bring the tears to the eyes, gives relief. Measures should then be taken to clear from the bowels any possibly irritating substances.

### NERVOUS DIARRHEA

We have here a condition with no discoverable lesions, but morbid irritability of the bowel so that action is provoked by irritations incapable of so acting in normal individuals. Three forms have come to the writer's notice. In lenteric diarrhea the taking of food quickly excites bowel action, the food being evacuated much in the condition in which it was swallowed. The patient may exhibit evidences of innutrition with ravenous appetite. This is most common in rickety children and may precede the appearance of the characteristic symptoms of that malady. In all forms of this affection the writer has obtained most success from the use of artificial digestives, especially diastase, with minute doses of arsenic—copper arsenite gr. 1-1000 every one or two hours while awake. Predigested foods are useful as offering the best chance for speedy absorption. Sometimes it is well to give the stomach absolute rest and feed only by the rectum, vagina and skin for a week. The personal and domestic hygiene always need to be carefully regulated.

Chronic nervous irritability of the rectum with fecal incontinence existed in one case with a hereditary syphilitic taint, and recovered completely on specific treatment and colonic lavage.

The third form may be exemplified by the following case:—A young lady while at a place of public meeting was seized with a sudden inclination to evacuate her bowels, so severe that before she could find a toilet room an accident had occurred. This so impressed her mentality that from that day she had to give up church and all social intercourse. If a visitor was announced, as soon as she entered the parlor she would be seized with the inclination to go to stool and had to beat a precipitate retreat. By the time she had reached her toilet room the inclination might have subsided or not. This went on until she became practically a hermit, being excluded from everything that took her from her room.

She was well nourished, not at all neurotic otherwise, well educated, intelligent and in all other respects apparently in perfect health. After the lapse of years this malady was cured by suggestion.

### ENTEROSPASM

Occurring primarily or secondarily to tubercular meningitis or lead poisoning, we rarely meet cases in which there is constipation from spasm of the intestinal musculature. The feces may be ribbonlike, or pipe stem, or in little bolls like sheep dung. Spasm of the rectum may accompany fissures, etc. The diagnosis is made by excluding organic strictures, etc., and recognition of the neurotic element. Treatment lies in excluding causes of nerve leakage and local irritation, and strengthening the nerves generally. Copper arsenite or sulphocarbolate in small and frequent doses may prove effective. Try the latter, gr. 1-67 every two hours, with a soothing nervine like cypripedin, gr. 1-6 at each dose.

All gastrointestinal neuroses respond to the ordinary treatment of depressed or exhausted nerves. Change of hygienic conditions, mental rest, means for restoring normal conditions of life and feeling, with the treatment of all material abnormalities, however trifling and apparently inconsequential, are advisable. It is impossible to lay down more definite directions; each case demands the management appropriate to the conditions it presents. The man who treats all abdominal pains with codeine, and all nervous aberrations with bromides, misses a lot of the pleasure that comes from the practice of medicine.

## IX. DISEASES OF THE LIVER

### FLOATING LIVER

Floating liver occurs ten times more frequently in women, following repeated pregnancies with too early escape from bed. Accessory causes are violent exertion, vomiting, coughing, sneezing, or falls. Lacing and rapid emaciation occasionally contribute. All these causes are far more frequent than this result. Pressure is not directly painful but may elicit pain in other parts. The traction may cause pain, especially after muscular effort or strain. Painful paroxysms may occur spontaneously. The pains are generally relieved by some particular manipulation, or by pushing the liver into some easy position. The pain is felt in the normal location of the liver and may radiate to the right shoulder or the lumbar region. Bearing-down, colic, fullness, intestinal disorders,



fainting, and a belief in the presence of some living animal in the abdomen, may attend. Eructations, flatulence, gastric disorders and constipation, are also attendants. Various mechanical difficulties may be caused by the dragging, twisting and occasional compression of other organs, such as dyspnea, palpitation, ascites, hemorrhoids, metrorrhagia, edema of the legs, albuminuria, purpura, polyuria, and rarely jaundice. Repeated hematemesis was reported in one case.

Palpation and percussion show the liver in an abnormal situation and its absence from its ordinary place. Easy replacement when lying supine is significant. The liver always seems large. Diagnosis may be impossible until tapping. Mistakes have been caused by the presence of a thickened mesentery; and the liver has been mistaken for hydro-nephrosis, floating kidney, renal tumor and typhilitis.

**Treatment:**—The lost abdominal tone may be supplemented by an elastic bandage, and possibly restored by faradic massage, cold douches, and suitable exercises. Since berberine restores contractility to relaxed connective it should be given in full doses to toleration for months.

## JAUNDICE

The slightest obstruction to the flow of bile in the biliary passages suffices to cause reabsorption. Bile appears first in the urine, and within 12 hours in the skin, preceding this in the conjunctiva. Its color is imparted to the blood plasma, serum of blisters and exudates, cerebro-spinal fluid, the connective tissues selectively, less to the nervous and muscular tissues, slightly to the glandular and epithelial cells except the rete Malpighii and kidney, and the fetus. The pigment is excreted by the kidneys, causing degeneration of the epithelium and occlusion of the uriniferous tubules. Pus contains bile but no mucous secretions except that of the intestines. Milk and pneumonic sputa are rarely colored, saliva never. The color of the skin varies from lemon yellow to bronze. The itching is not due to bile but to the elimination by the skin of toxic matters formed in the bowel. The presence of bile in the urine is detected by adding to it a drop of commercial nitric acid, on a porcelain plate, when a play of colors is seen. The stools are dark if the diet be of meat, putty-like otherwise; and are generally very offensive. Constipation and flatulence are present. The blood becomes toxic and intense jaundice induces coma that may be fatal.

Jaundice may be caused by emotion, it may occur in pregnancy or menstruation, fasting, or be due to syphilis, affects 15 to 85 per cent of newborn infants, follows large extravasations of blood, hemoglobinuria

or any poison that dissolves red cells and may be due to excessive production of bile. It may follow anesthetics, accompany acute infections, and occurs in epidemics.

## CATARRHAL JAUNDICE

**Etiology:**—This is usually an extension of catarrh from the duodenum and stomach, hence results from over-eating, or the use of unwholesome food, cold drinks, or alcohol to excess. Chronic alcoholism predisposes. The acute attack may follow exposure and catching cold. Previous attacks establish predisposition, and so also do hyperemic conditions of the liver. The cause cannot always be discovered. Catarrhal jaundice occurs in the course of infections, such as malaria, typhoid fever and cholera; in phosphorus poisoning, calculi and other obstructions. The disease occurs more frequently in young men.

**Symptoms:**—Following a catarrh of the stomach with digestive difficulties, headache, dizziness, depression and sometimes fever, constipation and scanty, high-colored urine, the eyes, skin and urine begin to show the yellow tint; the feces become light and offensive. This may persist for one or two weeks. When the digestive symptoms subside, color returns to the stools and disappears from the urine, that of the skin persisting longer. Convalescence is apt to be prolonged.

To this typical course there are many exceptions: Jaundice may be the first symptom manifested; the obstruction may be intermittent; the pulse is slow; there may be pressure in the liver, which may be swollen as well as the spleen; the urine contains bile, urobilin, hyaline casts, some times albumin. After the first week the temperature is a little subnormal. Itching is usually most violent after the first few days.

Abortive forms are brief and mild. Sometimes the malady lasts for months, with exacerbations from indiscretions in diet or otherwise. Intercurrent febrile attacks may be ascribed to infectious invasions. If the attack persists for some weeks the digestive symptoms subside, while depression and debility increase, with emaciation from hepatic auto-intoxication. Sometimes the attack resembles typhoid fever, with severe gastric symptoms, aching of the head and limbs, marked depression, insomnia, chills and high fever, enlargement of the spleen and other evidences of general infection. The liver may be tender and enlarged; the fever intermittent; and in its tedious course and subsidence the resemblance to typhoid fever may be close.

Recovery may be incomplete, with recurring acute attacks, or calculi may form as a result, or suppuration of the ducts. The disease may



persist in the cystic duct and gall-bladder. Chronic inflammations of the hepatic tissues, cirrhosis, and rarely acute yellow atrophy may follow.

**Anatomy:**—The epithelial layer is destroyed, and a secretion of mucus occurs containing leucocytes. Mucous plugs may occlude the common duct. The walls may be stained with bile. The degree to which bacteria contribute their influence is not yet determined. Toxin absorption from the bowels complicates the clinical picture.

**Diagnosis:**—Typical cases are easily recognized. In others jaundice may mask an underlying disease, as in gallstones and compression. The history and course must be scrutinized, the patient's youth considered, and the previous existence of gastrointestinal catarrh.

**Prognosis:**—The prognosis is good, but the duration of the attack cannot be predicted. Acute febrile cases continue several weeks and seriously impair the strength and nutrition. Mild, incomplete cases are exceedingly irregular. Elderly patients may die from long-continued obstruction.

**Treatment:**—Empty the bowels with calomel, followed by salines and repeated enemas, preferably of cold water thrown into the colon. Strictly limit the food to hot liquids. Give sodium succinate, 5 grains every six hours; boldine, gr. 1-67 every two hours; chionanthin or dioscorein, gr.  $\frac{1}{2}$ , every two hours; The benefit resulting from each of these remedies appears to be unmistakable, but we are not as yet able to distinguish the cases in which each should be selected. The free use of water is advisable. The patient should be kept quiet. If the attack is due to catching cold, diaphoretics are indicated, and of these the most effective is pilocarpine, which is also a specific for the itching. The diet should be carefully watched during convalescence. Nitromuriatic acid has long enjoyed a reputation which cannot be altogether undeserved. The strong acid only should be used, in doses of five drops, well diluted, before meals. Most of the remedies that have acquired repute in the treatment of jaundice act simply by clearing out the alimentary canal and putting a stop to intestinal toxemia. The four remedies mentioned above, however, seem to exert a special effect in subduing catarrhal inflammation of the biliary passages.

## INFECTIOUS CHOLANGITIS

Suppuration is much less common in the biliary passages than catarrh.

The disease is rare, and occurs in elderly persons with some obstruction to the discharge of bile, or complicating dysentery, typhoid, septicemia or cholera. The source of infection can not always be traced.

The invading organisms may not cause any disease appreciable during life, or even at post mortem. The most frequent infective agent is *bacillus coli*, alone or with various cocci. *Ascarides* may occasion the attack by carrying microorganisms into the biliary passages. Typhoid fever is the malady most frequently complicated with infective cholangitis, and the bile often contains *bacillus typhosus*, even months or years after convalescence has commenced. Implication of the biliary passages may account for the jaundice sometimes present in pneumonias.

**Symptoms:**—These are uncertain and not characteristic. Jaundice is not marked and is due to obstruction, which is not always present, or may not be due to infection. Fever and swelling of the spleen are significant, the former of septic, sometimes of malarial type. Gall-stones may complicate the picture. Other toxins absorbed may depress the heart, lower the temperature, or stimulate the kidneys. There may be pain or tension in the liver, especially severe if the gall-bladder is inflamed. Digestive disturbances, diarrhea and vomiting are frequent. Leucocytosis is absent in the intervals, and the excretion of nitrogen by the kidneys is diminished on the febrile days. Tenderness near the spinous process of the 12th dorsal vertebra has been found by Boas. Occasional complications are pyelophlebitis, true septicemia, endocarditis, suppurative meningitis and peritonitis.

The course is insidious and variable. Occurring during the course of a specific infectious fever the symptoms may be inconspicuous; little if any jaundice, fever and tension. Coming on during convalescence from typhoid fever we may apprehend a reinfection of the bowel.

The prognosis is not good. The dangers of calculi are increased by abscess formation. Ulceration is most common in typhoid infections. The discharge of a calculus is favorable.

The diagnosis may be made when to the evidences of gall-stones we add a fever of septic or remittent type, with progressive debility. Doubtful cases may be distinguished by a careful study of the temperature curves. Pyemic fever reaches its acme after noon. The presence of leucocytosis, or of pigment and plasmodia in the blood, indicate malaria. Local symptoms place a suppurative malady in this region. In hepatic abscess the jaundice is less evident, and the previous history varies.

**Treatment:**—The occurrence of such infections emphasizes the importance of maintaining intestinal antiseptics throughout attacks of infectious fevers. The remedies that have proved efficacious in gall-stone will probably be found to favorably influence this malady as well; and should receive full trials. Digestive disturbances may be prevented by the use



of the salts of bile acids. *Ascarides* should be expelled from the bowel. Five grains of sodium succinate, boldine, gr. 2-67, dioscorein and chionanthin aa, gr. 1-3, four times a day may be taken as a commencing adult dose. The pains may be alleviated by hot enemata, and by hyoscyamine given till effect. The diet should be carefully regulated, and milk has been most highly recommended. Give it warm, eaten slowly, a glass every four hours, and no other food whatever.

Other means at our disposal are saturation with calcium sulphide, a remedy which is indicated in all pus infections, wherever located, and nuclein medication.

## CHOLECYSTITIS

When the biliary passages are inflamed the gall-bladder is usually implicated if not always. The same causes are therefore present as in cholangitis. The mucosa is inflamed the mucous secretion increased, thickened by epithelium cast off, and the narrow outlet becomes occluded. The bladder dilates and its walls become hypertrophic and finally cirrhotic. Peritoneal adhesions form. When the contents are absorbed or discharged the sac contracts, or its walls may calcify. Corsets frequently give rise to this malady. Gall-stones are frequently present. Suppuration is not common. Distention may lead to ulceration, especially in typhoid cases, sometimes forming fistulas.

The pain is inflammatory, severe if the serosa is involved and in acute attacks, increased by motion, distention or peristalsis. The distended gall-bladder forms a tumor recognized by its shape if not obscured by surrounding lesions, or by tension of the abdominal parietes. It is pear-shaped, and moves with the liver and with respiration. Fecal collections and appendicitis may simulate it, or corset liver. All grades as to acuteness and length of course are possible. The pain and swelling are apt to be worse if suppuration occurs, the continuous fever changing to the septic type. Cutaneous edema may attend adhesions.

The diagnosis must frequently be inferential.

Confine the patient to bed, restrict the diet to unirritant fluids, and restrain peristalsis and spasm by full doses of hyoscyamine, gr. 1-250 every fifteen minutes to an adult until the mouth begins to feel dry, then another dose whenever this ceases. Leeches, cold or heat, over the affected viscus, give relief—the choice lies with the patient's preferences or the effect. The lower bowel must be kept empty by colonic flushing with warm saline solutions. Give a course of sodium succinate as described above.

## GALL-STONES

Gall-stones are composed mainly of cholesterin, bilirubin-calcium and calcium carbonate, in varying proportions.

Their shape depends on their location and number. Single stones are rounded or oval, multiple ones are faceted by contact with each other. The sides next the mucosa are rough, those facing other stones smooth.

The size varies from mere sand up to masses several inches long and wide, and several ounces in weight.

**Etiology:**—Gall-stones are formed by the deposit of their elements, from the bile, upon a nucleus. Naunyn found myelin from fatty degeneration of epithelium formed the nucleus, surrounded by a shell of lime salts, or a soft shell of cholesterin and bilirubin-calcium, with a fluid center. Calcic stones form in the bile ducts, with pigment whose oxidation Naunyn attributes to bacteria. The subsequent deposits are cholesterin pure or with lime salts. The infiltration and recrystallization of cholesterin accounts for the radiated structure. Contraction and expansion, with the solvent action of bile, sometimes cause spontaneous cure. The primary cause of biliary calculi is therefore catarrh of the biliary mucosa. The catarrh is attributed to bacteria. Microorganisms have been found in recently formed calculi, most frequently typhoid and colon bacilli. Stasis of bile favors infection. When germs are virulent, acute cholecystitis results; if attenuated, cholelithiasis if the outflow is obstructed. The latter condition is especially favored by the corset and by pregnancy, hence the greater prevalence of gall-stones in women. Sedentary habits also favor the formation of calculi, as do mitral and other obstructive valvular diseases, and all conditions favoring indigestions. The prevalence increases constantly with age. Some localities seem to be affected more than others.

**Pathology:**—Gall-stones have been found in autopsies in from 2.4 per cent to 29 per cent. Mosher in Baltimore found them in 6.94 per cent. Poulson says symptoms during life are only presented by 8 per cent of cases. The number of stones varies from one up to Otto's 7802. The stones may be encysted or free. The gall-bladder is enlarged, or contracted, catarrhal, ulcerated, adherent, cystic, hypertrophic, trabeculated, cicatricial, dropsical, diphtheritic, ecchymotic, necrotic or perforated. Similar changes occur in the gall-ducts. Secondary changes occur in the hepatic parenchyma. Multiple abscesses may form, or suppurative cholangitis, pylephlebitis, or portal thrombi. Fistulæ may penetrate the skin, peritoneum, diaphragm, intestines, pleura, lungs,



etc. Carcinoma is a result, not a cause of gall-stones (Quincke.) The calculus may migrate to the iliac fossa, the female genitals, the urinary bladder, etc. If a large stone enters the small intestine it may cause obstruction at the ileocecal valve, or in the duodenum. It may enter the appendix. The bacteria sometimes cause endocarditis.

**Symptoms:**—In the vast majority of cases the malady is not suspected during life. Usually the first symptom is caused when the stone enters the duct, when it excites inflammation or ulceration, or when it blocks the passage of bile and infection ensues.

Prodromes consist of intestinal catarrhs, especially duodenal, which may extend to the bile ducts; or of catarrhal jaundice alone; but no such malady precedes in many cases, and the first symptom attributable to cholelithiasis is the attack of colic. Some patients complain of epigastric weight, altering its location with changes of posture, worse after sitting or standing for long periods (probably myalgic) and near the close of gastric digestion. There may be dull pain in the right epigastrium, radiating to the right shoulder, thorax, hypogastrium or lumbar region. The appetite may be capricious, anorexia alternating with gluttony. Slight errors may cause nausea and bilious vomiting. The nervous condition is low, with irritability and depression, itching or burning. There may be disturbances of sight or hearing, coryza, headache, neuralgia and other indications of a leakage of nerve force, with "reflex" phenomena at the point of least resistance. The digestive secretion may be excessive or scanty. These patients dislike laxatives and these may occasion abdominal distress.

Very rarely the stones may be recognized on palpation. Some have even heard the stones rattle!

Calculi in the hepatic ducts are usually latent, rarely causing inflammation or jaundice. In the cystic or common duct they are usually movable and cause trouble. Even then there may be no pain, as gall-stones may pass without having occasioned any previous symptoms. More frequently hepatic colic results. Stones may be impelled to move by violent exercise, over-eating or drinking; delivery; surgical operations; menstruation; psychic crises, etc. Contraction of the muscular fibers of the gall-bladder forces the stone into the cystic duct where it is firmly grasped by the irritated fibers of the muscular coat and held spasmodically until, the irritability of the fibers being exhausted, they relax and allow the stone to slip forward until it is grasped by a new set. Irritations of the duodenal or gastric musculature may be transmitted to the gall-bladder. If the stone is large in relation to the lumen of the duct, considerable time may be required before the dilatation suffices for

its passage. The tortuous course of the duct and its twisted, folded, mucous coat aid in obstructing the passage of the stone. The common duct being wider, the course is more rapid, but delay is occasioned by the sphincter at its outlet. Indeed, the stone may be permanently arrested here. When the stone drops into the duodenum the spasmodic pain ceases at once. The size and shape of stones influence the rate of passage, but even very small ones excite spasmodic contractions, and smooth stones quite as much as rough ones. Calculi too large to pass through the ducts remain in the gall-bladder or biliary ducts, or escape by ulceration. Soft stones may be molded or crushed by the pressure. Contraction of voluntary abdominal muscles may aid, but increases the pain. Vomiting exercises a similar influence, and the relaxation it causes lessens the principal obstacle—spasm of the ducts.

The attack may begin with pain and a sense of pressure in the epigastrium or at once with violent colicky pain, usually in the afternoon or during the night. The pain is boring, stabbing, tearing, persistent and unbearable, the patient groaning heavily, shrieking, crying, or sometimes silent, collapsed, the face pallid, lips blue, eyes sunken, covered with cold sweat, extremities cold, pulse wiry and small. The pain is often in the region of the gall-bladder, but may be in the epigastrium, left hypochondrium or breasts, and radiates in all directions. It may be in the back, simulating renal colic. Epigastric pain locates the stone in the hepatic ducts. Inspiration is painful and the breathing is rapid, shallow and costal. Patients twist the body to the right and draw up the legs, to relax the right abdominal muscles. Rigidity and spasms are not uncommon here. Temporary remissions may occur. When the stone enters the common duct there may be a pause or the pains may be easier until the sphincter is reached, when the severe cramps recur. If the stone drops back into the gall-bladder the pains cease as abruptly as when it falls into the duodenum. Much soreness remains, with a bruised sensation. Tenderness in the gall-bladder indicates that the stone has fallen back. The suffering seems less in the aged whose irritability is less, and when the ducts have been dilated by repeated passage of calculi. The vomiting is apt to be violent; at first of food, then of bile, and sometimes the calculi are thus ejected. Chills or rigors may occur, and fever develop, which subsides in some hours or endures several days, as the stone passes. Even without septic infection it may be intermittent. Lodged in the ampulla of Vater, a stone may cause recurring febrile attacks with pain and jaundice, acting as a ball-valve. Some infection is apt to follow. In fact, to this a part at least of the fever may be attributed in all forms.



Jaundice is usually but not always present; as when the obstruction is in the cystic duct, when it does not occlude the common duct, when it passes the latter too rapidly for reabsorptive back-pressure to develop, and when it has left the biliary passages and formed a fistula. If a small hepatic duct is occluded there may be no apparent jaundice, but traces of bile may be detected in the urine. Time must be allowed for collection and reabsorption of bile before jaundice appears—perhaps some days. It persists as long as obstruction of the biliary ducts endures. The intensity of the color varies. The urine is reddish yellow to black. The bilirubin may be detected here before the skin shows color change. The greatest impregnation of the urine occurs when the obstruction ceases and the stored bile passes at once into the duodenum, the pigment being rapidly converted into urobilin and excreted as such.

Search should be made for the stones by passing the feces through a hair sieve for several days. Failure to find the stone may be due to its dropping back into the gall-bladder, its retention in the biliary passages, or in the common duct, or its disintegration.

Stones less than a hazel-nut in size pass through the ducts in time; larger ones become impacted and if freed at all it is by ulceration.

When the attack has subsided it leaves debility, anorexia, disturbances of digestion and nutrition, and insomnia. But the most distressing sequel is the itching. During the greatest severity of the paroxysm the patient has adjured the physician to prepare for combating the itching which would follow, as she knew by experience. Death rarely ensues from the toxemia or from the failure of the nervous system to bear the suffering.

Since only about one person in twelve of those who carry gall-stones even presents a recognizable attack, we may look for evidences of these calculi in any anomalous abdominal malady. The detection of a trace of bile in the urine is then significant, though not conclusive. Not all attacks are as severe as those described and many may be abortive.

**Complications:**—Infective cholangitis and cholecystitis; hepatic abscess; ulceration; stricture; encapsulation; permanent occlusion of bile ducts followed by many consequences; lesions of tissues invaded by the ulceration; obliteration of the gall-bladder; *hydrops vesicae felleae*; permanent jaundice; cholemia with furuncles, hemorrhages, cirrhosis, coma, enlarged spleen, ascites; carcinoma. If the bile does not find an outlet into the intestine death results in six to twelve months. Impacted in the bowel, gall-stones may be dissolved or disintegrated, or form the nucleus of fecal masses.

The vomiting of fecal matter indicates the low location of the obstruction. Attacks of ileus are common. Death ensues from exhaustion and collapse, rarely from peritonitis. In protracted cases anemia, debility and emaciation occur. Many nervous phenomena have been described. Hemorrhagic pancreatitis was found in one case by Opie, bile having entered the pancreatic ducts.

**Prognosis:**—While there is always danger, the prognosis is good. Violent fever, total obstruction, peritonitis, infective attacks and suppuration, are grave. Peritoneal perforation causes imminent danger. Impaction in the bowel, grave tissue alteration in the liver, ascites, collapse, marked debility, anemia or emaciation, and the development of cancer are ominous.

**Diagnosis:**—Rarely, when the stones are quiet, physical examination may detect them. The presence of a trace of bile in the urine always indicates obstruction and reabsorption. Lanphear says that gall-stones may be assumed in any person over 45, with pendulous abdomen. The enlarged gall-bladder is attached to the liver, moves with respiration, is freely movable, but returns to its place. It cannot be pushed upward (Gerard-Marchand). Puncture and rude palpation are perilous. Gall-stones cannot be detected by the x-ray, which traverses cholesterin.

Colic is usually the first evidence. In peptic ulcer the pain follows meals; in gall-stones it occurs near midnight; violent vomiting is seen rather in the latter. In intestinal colic the pain is in the right hypochondrium, is less severe, and is relieved by discharges of gas, or feces. Lead colic presents similar attacks, but is more common in men who have used the metal; the blue line on the gums, absence of liver symptoms and jaundice, are notable. Renal colic is felt in the lumbar region, along the ureter, and the testicle may be retracted. Circumscribed peritonitis has its own causal history and no hepatic symptoms, but tenderness, quick pulse and early collapse, with costal respiration, and indoxyl in the urine instead of bile. Jaundice is a most important sign, and by its variations affords an insight into the progress of the attack. The presence of infectious agents may be determined by studying the temperature. Hepatic abscesses are often unrecognizable. Tenderness of the liver, pyemia, septic fever, and secondary suppurations, may indicate their presence.

The final proof is the detection of the calculi in the stools.

**Prophylaxis:**—To prevent cholelithiasis we must prevent stasis of bile and infective cholangitis. Tightness of clothes over the liver, corset pressure, especially in the thin, sedentary habits, conduce to the malady.



Exercise and cold bathing aid in preventing it by favoring the movement of bile. Constipation calls for saline laxatives. Several observers warn against going too long without meals. Too uniform a diet and excess of fat are to be avoided. Infections of the stomach and bowels are always capable of affecting the biliary passages.

**Treatment:**—Basing our treatment of the paroxysm on the spasmodic character of the pain, we seek to relieve this by the administration of the speediest of antispasmodics, glonoin. The brevity of its action necessitates the addition of hyoscyamine by which the effect is prolonged, while by relaxing the contracted vessels glonoin permits the hyoscyamine to enter and develop its effects more speedily. Looking upon all spasm as an indication of deficient nervous control we add minute doses of strychnine to restore the supremacy of the controlling nerves. Our prescription for an adult is therefore: Hyoscyamine, glonoin, aa gr. 1-250; strychnine arsenate, gr. 1-134, to be given together and repeated every ten minutes until dryness of the mouth indicates the full desirable action of hyoscyamine. If this does not render the suffering bearable a mere whiff of chloroform or ether will suffice to complete the relief. So certain is this treatment that we may rest assured that when it fails there is present a mechanical condition whose relief is only to be secured by mechanical intervention. These remedies are best administered each in a teaspoonful of hot water, to be absorbed from the mouth. If the gastric irritation is too great, a full dose may be given by hypodermic; though the intensive small-dose method is in every way more desirable. The usual method of treating the paroxysm is by the hypodermic injection of morphine. This is not as powerful an antispasmodic as hyoscyamine, and as an analgesic its effects are neutralized by the pain. The doses are repeated, increased, and at last, impelled by the prayers of the patient for relief from her excruciating suffering, a huge dose is given. Just then the stone rolls into the duodenum, the antagonism exerted by the pain ceases, and the patient experiencing the whole force of the morphine is narcotized, perhaps fatally.

Quite recently reports indicate that the new anesthetic tablets of morphine, gr. 1-4, hyoscine hydrobromide, gr. 1-100, and cactin, gr. 1-67 excel anything as yet tried in relieving these agonizing paroxysms. The method seems as safe as it is effective.

Is there any treatment that will prevent the recurrence of the paroxysms? The surgeon denies this, demanding proof that any remedy proposed will, in the body, cause solution of the calculi. The fact that in over 90 per cent of all cases the stones never occasion enough distress to lead to the suspicion of their presence, would indicate that the removal

of the stones is not a necessity. Moreover, the acknowledged solution by the bile that sometimes occurs points to the possibility of this solution being favored by remedial agents. The production of an abundance of thin, highly alkaline bile, with great solvent power, the cure of biliary catarrh and extinction of infection in the biliary passages, as well as in the duodenum, are legitimate objects of medical treatment.

For twenty years the writer has treated every case of supposed cholelithiasis that has come to him in a somewhat extensive practice in the manner to be described. Admitting that the diagnosis may have been mistaken in some instances, he would submit that the assumption that in that period he never saw a true case of this disease, but was always mistaken, is scarcely to be seriously held by any but a purblind advocate of the "no-treatment-but-surgical-" dogma. The treatment adopted consists in the administration of sodium succinate, gr. 5 four times a day, before meals and at bedtime. This is to be continued for one year. During this period the paroxysms become progressively less severe and less frequent, until long before the expiration of the year they have entirely ceased. This happy result has followed in every case treated by the writer with this remedy in twenty years. In not one has surgical intervention been required. Nevertheless, we are not bigoted opponents of surgery, and as above stated urge a prompt resort to it whenever the failure of the treatment for the paroxysm above advised indicates the presence of mechanical conditions in which surgical intervention is preferable, even if not absolutely necessary.

In France boldine has acquired so great repute as a systemic remedy for this malady that we have felt obliged to advise its use in addition to the succinate of soda, giving of boldine seven milligrams a day for prolonged periods. It has seemed to the writer to be distinctly effective, in a similar manner to the succinate, and the results obtained to be more rapidly induced by the combination. Among the Eclectics dioscorein in the paroxysms and chelidonin in the intervals have won favor too universal and decided to be without value. Dioscorein may be given in hot water, gr.  $\frac{1}{8}$  to  $\frac{1}{2}$  every ten minutes; the dose of chelidonin is a grain a day, in divided doses. These remedies may be added to those above recommended if deemed advisable; or employed in the absence of the former.

Heat to the feet, counterirritants over the liver, supportive foods and medicines, may be employed as adjuvants during the paroxysms. Hot enemas are probably useful. The bowels should be emptied.

In the intervals constipation should be carefully avoided and gastroduodenal catarrh relieved. Copper arsenite, gr. 1-67 before meals, is



useful, and five to twenty grains of sodium sulphocarbolate may be given with each dose of the succinate. Mineral waters are useful as diluents, and in proportion to the soda they contain. The diet should be nutritious, easily digested, taken at regular intervals, and in just "dose-enough," neither too much or too little. Excess of fats, ices, iced beverages, beer, alcohol in general, tainted or infected foods, are to be forbidden strictly. The patient should wear wool next the skin and avoid taking colds. Judicious exercise and bathing contribute to the prevention of attacks.

The itching of the jaundice is quickly relieved by a dose of pilocarpine sufficient to induce sweating—gr.  $\frac{1}{8}$  hypodermically.

The ingestion of fats has no effect on this disease, excepting in so far as they relieve the constipation on the one hand, or induce digestive disturbances on the other. Quincke advises meals every three hours, to stimulate the production of bile. Too sparing a supply of water leaves the bile too thick for solvent power. Lime in food or water does not favor the growth of the stones. There is no plausible indication for any form of electricity. The value of vegetable extracts was inferred from Glisson's observation that in cattle gall-stones seem to disappear when the winter has passed and green forage is accessible. Olive oil in large daily doses keeps the bowels open but has no other effect, the apparent calculi voided during its use being composed of soap derived from the oil. Ice over the gall-bladder may give some relief. Some patients are easy while immersed in a warm bath. If the bowels must be evacuated and the stomach rejects everything, a cold enema of saturated salt solution acts promptly.

Operation is advised by Quincke at once if suppurative cholangitis or cholanystitis, or incipient peritonitis, appears. Salicylic acid has proved an effective remedy to disinfect the biliary passages, and sodium succinate probably acts also in this way. Operation is perilous in prolonged jaundice, as hemorrhage is apt to follow.

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**Hyperemia** of the liver occurs during digestion. Congestion attends obstructive heart diseases and pulmonary maladies. The former may be carried to pathologic degree by excess in eating and drinking, alcohol, etc., and by fecal toxins absorbed; also by infectious fevers, suppressed menstruation, etc. It causes a sense of fullness and aching, increased by motion or lying on the right side.

**Hepatic hemorrhage** is a feature in many maladies.

**Perihepatitis** in various forms attends many hepatic maladies, or may be induced by corset pressure.

**Acute Hepatitis** accompanies infectious fevers, due to toxemia, and may be caused by a number of poisons. It occurs also in northern men residing in the tropics. The treatment consists in emptying and disinfecting the alimentary canal to stop toxin absorption, regulating the diet and personal hygiene, and return to the cooler latitudes if this is possible.

**Acute atrophy of the liver** occurs rarely, in women between 20 and 30, during or following pregnancy; more rarely under other circumstances. The causes are obscure. Quincke suggests intestinal and bacterial toxins. The attack begins as an acute catarrh of the stomach and duodenum, passing to the biliary passages. Suddenly evidences appear of profound toxemia, stupor, delirium, restlessness, mania, rapid shrinking of the liver and swelling of the spleen, hepatic pain, hemorrhages, from all sources, subnormal temperature, and death in a few days from coma. The hepatic substance is destroyed, but in cases recovering is rapidly regenerated. Jaundice is intense, with tender liver, vomiting, constipation, slow pulse and convulsions especially in the young. Half die within two weeks, one-third more before the fifth week. Recovery is possible.

The malady is obscure—a swift local poisoning with an unknown toxin. It resembles phosphorus and phallin poisoning, and acute fatty degeneration. Quincke pronounces it a purely chemic poisoning, the toxin generated in the bowel, part of the symptoms due to cessation of liver detoxication. The diagnosis is never made until the grave symptoms are presented, when decrease of the liver is detectable, with leucin and tyrosin in the urine, with intense jaundice, etc.

Prevention indicates the wisdom of flushing and disinfecting the bowel in every case of catarrhal jaundice, and in pregnancy (Quincke), and examinations of the urine. The only treatment that has succeeded is free purgation, with warm baths to favor elimination and quiet restlessness.

**Abscess of the liver** is occasioned by bacterial invasions, sometimes carried by parasites. It may be traumatic, without penetration. Suppuration along the gastrointestinal canal furnishes most cases, some coming by the hepatic artery from the heart, etc. They are more frequent in men, and in the tropics, except when due to appendicitis. Uteroovarian suppuration contributes some cases, and operations on hemorrhoids a few.

The symptoms are cachexia, despondency, anemia, fever remittent or continuous, of septic type, pulse small and weak, and the typhoid state with stupor. There may be much, usually little, sometimes no,



local inflammatory trouble manifested. Pain is prominent if the surface is affected. Partial enlargement occurs when the abscess projects from the surface. Intrusion on other organs causes characteristic symptoms. The abscess may discharge through the skin, diaphragm, into the pleura, bronchi, lung, stomach, bowel, bladder, or peritoneum.

The prognosis is worse in pyemia, portal infections and traumatic cases; better in non-virulent forms, tropical abscesses and when operation is performed early. The x-ray may aid the diagnosis. The pus obtained by aspiration may be bloody or fetid.

Prophylaxis demands the antiseptic treatment of dysentery and other gastrointestinal infections, while sulphide saturation may prevent or abort suppuration, aided by nuclein, and the resisting powers are to be maintained at the highest point. Ice over the liver and leeches to the perineum relieve pain and hyperemia. Relief has been obtained from hepatic punctures with abstraction of blood directly from the liver.

## CIRRHOSIS OF THE LIVER

**Etiology:**—The most common of hepatic maladies, one whose causes, course and treatment are best comprehended. It occurs mostly in men, after mid-life, habitual users of strong liquor. Periodic debauches do not occasion cirrhosis, but the daily use of strong liquor, taken "straight," on an empty stomach. A man may never have been intoxicated and yet have a cirrhotic liver. It is probable that the addition of volatile oils increases this tendency, hence the danger in "cock-tails." Syphilis comes next to alcohol as a cause, then malaria and possibly typhoid fever, cholera, scarlatina, gout, rickets, etc. Several factors act together. In some the cause cannot be traced, and these may be attributed to toxins of intestinal origin, or to microorganisms which resist the destructive action of the liver. There is also an individual vulnerability to this disease and a hereditary disposition.

**Pathology:**—The cirrhotic liver is small, surface studded with "hob-nails," over which the serosa is thick. The connective tissue is hyperplastic and its growth and contraction causes destruction of the liver cells. The white fibrous tissue increases and elastic fibers are also formed, both penetrating the lobules. In the reticulum the process is hypertrophic rather than hyperplastic. Sometimes the surface is smooth, but shows similar microscopic changes. The process is of many years' duration. The hepatic cells are destroyed by pressure and by cutting off their blood-supply, the protoplasm first becoming fatty. Portal stasis results from destruction of the capillaries.

**Symptoms:**—The primary hyperemia caused by alcohol being repeated with every dose is not a single process confined to a certain period and to be recognized by symptoms. It is in fact continuous and inextricable from its later consequences. We have in some cases the alcoholic dyspepsia with morning nausea, anorexia, and growing inability to digest food without the accustomed stimulant, and later even with it. The steady drinker tends to become sparing in his diet and to choose such foods as are digested most readily; also to consume large quantities of condiments, such as red pepper, mustard and horseradish. Occasional attacks of pain in the liver may be due to hyperemia from these substances, or to intestinal toxemia. As a rule nothing calls attention to the liver during the period of enlargement. The organ is firm and somewhat sensitive. Reduction in its size is not easily determined by percussion unless extreme. Palpation may detect nodulations in the later stages. Jaundice is slight or absent. Destruction of the capillaries leads to obstruction of the portal circulation and the blood is engorged in its roots, inducing fullness of the capillaries of the stomach, intestines and spleen. Catarrh of the mucosa follows, with anorexia, diarrhea, hemorrhoids, enlargement of the spleen, and hemorrhages from the mucous surfaces. When the engorgement reaches a certain point the serum transudes into the peritoneal cavity and ascites results. Constipation, flatulence, indigestion and difficulty of absorption into the distended vessels induce innutrition. Collateral channels open in the liver and the distention is somewhat relieved, at the expense of toxemia, the blood escaping the detoxicating function of the liver cells. The spleen enlargement is partly due to a similar cirrhotic process. Ascites usually develops slowly, but may follow a blow or a cold quickly. The fluid is yellow, sp. gr. 1012 to 1014, and contains 0.6 to 1.2 per cent of albumen. It may contain a little blood and more albumen, especially if the serosa is inflamed. Edema of the lower limbs follows ascites. The urine is scanty from compression of the veins. The diaphragm is pressed up, and lung and heart-action impeded, the dyspnea becoming oppressive. Gastric ulcer may appear.

The veins dilate and form collateral channels, the hemorrhoidal with the hypogastric, the inferior esophageal with the vena corona ventriculi and vena azygos, and veins in the hepatic ligaments and perihepatic tissue are formed and connect the liver and diaphragm. A vein in the ligamentum teres unites with those of the abdominal wall, the subcutaneous vessels dilate and become visible, the skin edematous. But all these channels do not relieve the engorgement enough to remove ascites. The esophageal veins sometimes give way, and fatal hematemesis follows.



Hemorrhage or effusion may occur from any of the new-formed channels. The urine is scanty, high colored, heavy; the kidneys are compressed and arterial pressure lowered. Nephritis occasions albuminuria, vesical hyperemia, hematuria; urea lessens, ammonia increases, sugar is occasionally present; albumoses may be found, or leucin and tyrosin, sarcolactic acid and increased quantities of fatty acids.

The heart is weakened by alcohol and by innutrition; the temperature is subnormal as nutritional metabolism fails, though intercurrent acute exacerbations may raise it temporarily. Cachexia gradually supervenes; the patient, perhaps fat in the earlier stages, tends to emaciate later, the shrunken members contrasting with the tumid abdomen. Dropsy becomes general. In the later stages hemorrhages occur from depravity of the blood, not stasis, and may prove fatal.

The same agencies that incite hepatic cirrhosis give rise to similar conditions in other organs; and we find the glandular cells of the stomach and duodenum replaced by connective tissue, interstitial nephritis, splenitis, pancreatitis, and similar changes occur in the brain and meninges, the muscles, etc. Peritoneal tuberculosis develops with notable frequency.

**Prognosis:**—No definite course; in adults it covers years. Change of habit may arrest the malady, and comparative health endure for years, with enfeebled digestion. Death is due to innutrition, heart failure, pulmonary edema, hemorrhage or some intercurrent malady. When decided atrophy is recognized the prognosis is bad; also when ascites has developed. General and increasing dropsy indicate the finish in sight.

**Diagnosis:**—In the early stages the inferential, yet a knowledge of the causes of cirrhosis, with the presence of the typical digestive phenomena, point unerringly to the malady. If a man takes his whisky "straight" on an empty stomach several times a day and has done so for years, if he has morning nausea and gastric catarrh, ejecting glairy mucus, has little appetite and prefers raw and acid meats, with quantities of condiments, and suffers from hemorrhoids, it is not necessary to have a house fall on one to arouse him to a comprehension of the situation. Swelling of the spleen is then significant, and the liver may be palpated and be found firm or nodulated, somewhat tender. Examination of the ascitic fluid detects tuberculosis and carcinoma.

**Treatment:**—Even in well-advanced cases a reform in the habits will arrest the malady—and if the patient still has enough liver cells to supply his needs today they will supply them for an indefinite succession of tomorrows. Stop the alcohol; relieve the resulting depression by full doses of strychnine, contract the atonic and dilated viscera by berberine, one to five grains a day, relieve the catarrh by zinc oxide, gr. i and copper

arsenite, gr. 1-100, before meals, and replace the condiments with hydrochloric acid, pepsin, pancreatin, bile acids, papayotin or diastase, judiciously selected and dosed to meet the needs of each case. Above all keep the bowels clear and aseptic, with morning salines and sulphocarbolate of sodium, since the toxins of this tract contribute powerfully to aggravate the malady and add to its dangers. Arrange the diet to combat the anemia, debility and denutrition, giving freely raw meats, soused meats, raw eggs and oysters, fish, raw fruit juices, especially of the citrus family, and milk—if possible warm from the cow: Clam broth, turtle soup, buttermilk and similar articles are palatable to these patients. Small and frequent meals are the rule. Time must be allowed; chronic maladies do not subside acutely.

Can we induce absorption of the new connective tissue? It has been claimed that the cirrhotic process can be reversed by ammonium chloride, nitrohydrochloric acid, salts of gold and platinum; and these claims have been derided but not disproved—or proved. Great benefit follows their administration, though we are unable to tell just why. Thiosinamin has been urged as a remedy capable of inducing absorption of cicatricial tissue, even to the reopening of old wounds; this seems the best established remedy, and may be given by the stomach in doses of a grain or two, three times a day, for several months, with expectations of benefit. A favorite old Navy formula consists of ammonium chloride and strong, freshly-made nitrohydrochloric acid, of each four drams, water to three ounces; 30 drops in water before each meal, and the skin over the liver to be painted with the solution at the same time, until it becomes sore.

With these remedies, judiciously applied—and patience—much more can be done in this malady than would be deemed possible by the tyro or the pathologist exclusively.

Diarrhea relieves congestion—don't interfere unless it is unavoidable. Salines and sulphocarbolates relieve the useless part.

Apocynin is the best diuretic: gr. 1-4 four times a day or more, "slows and steadies the cardiac action, increases blood-pressure, stimulates the kidneys and seems to have a tonic effect on the general capillary system" (Stengel). Tapping gives great relief and seems really curative in some cases, besides freeing the compressed organs from this obstruction; but removal of outside tension allows freer transudation of blood-serum, carrying with it albumen and other nutritive elements. When it has to be frequently repeated the writer has introduced Southey's tubes and drained the peritoneal cavity continuously, with benefit and impunity. Strict antiseptic precautions should be observed.

The use of raw liver as a food is suggested.



***Hypertrophic cirrhosis of the liver*** is rare, generally seen in men between 20 and 30 years of age, sometimes in the young. The causes are obscure. Alcoholism is disputed, and if active there must be some other unknown cause participating.

The malady commences with indefinite digestive disturbance, anorexia, morning vomiting, epigastric pressure, felt also in the right hypochondrium; soon followed by jaundice, swelling and tenderness of the liver and aggravation of preceding symptoms. These and the jaundice subside leaving the liver enlarged. The attacks recur at long intervals, with increasing severity and duration, each leaving the liver larger. The jaundice becomes permanent, but not excessive. The stools are not acholic. The swelling of the liver causes visible protrusion. The liver is hard, the margin blunt and tender. The enlargement persists during life. The spleen swells also and is tender. There are no stasis, ascites, or collateral channels. The appetite returns and may be excessive, but nutrition fails and emaciation sets in. The urine changes with the condition, contains bile pigment and as improvement sets in becomes excessive.

Hemorrhagic diathesis develops. The course is slow, varied, the duration after permanent jaundice being 4 to 12 years. Hemorrhages become frequent near the end, with remitting fever and toxemia. When children are affected their development is impeded and the splenic enlargement is marked.

The prognosis is bad, no cure having as yet been recorded.

On general principles we should keep the bowels clear and aseptic, and until something better has developed adopt the treatment recommended for atrophic cirrhosis. The description of this malady given by Quincke points to a microbic infection by successive broods of some slowly incubating plasmodium. Sulphide saturation might be useful. Nuclein or pilocarpine could be tried if the leucocytes were scarce, but no observations seem to have been made on this point. Otherwise the treatment is purely symptomatic.

Cirrhotic affections of the liver occur in malaria, diabetes, and syphilis.

## NEOPLASMS OF THE LIVER

Carcinoma, sarcoma and adenoma are rarely primary, commonly secondary to similar growths of the gall-bladder. Whatever be the cause, it must come from the intestine through the portal vein. Malaria, alcohol and traumatisms favor the development. Chronic irritation seems to be an important factor, and cancer often follows cholelithiasis. Melanosar-

coma occurs rarely. Sarcoma is less frequent than carcinoma, usually secondary and then forms very large tumors.

**Symptoms:**—They vary greatly, the general history being: Disturbed appetite, disgust for meat and fats; emaciation even with forced feeding; pallor, skin dry, fragile, wrinkled, sallow, perhaps slightly yellow; pressure and fullness in the liver; pain radiating to the abdomen, breast, right shoulder; liver enlarged, sensitive, nodular; decided jaundice; ascites; general dropsy; cancerous metastases in pleura, peritoneum, etc; death from cachexia and heart-failure. Sarcomas run a like but faster course. In adenomas ascites occurs earlier, the liver is harder, the course slower. The cachexia is probably due to the absorption of cancer toxins. Edema results from hydremia. The skin hangs loosely in folds; debility, dyspnea and palpitation increase, or irritability and insomnia occur apart from pain. Stupor and coma end the scene. The liver is enlarged in spots, sometimes universally. Unequally-sized nodules may be felt. Large sarcomas give a board-like hardness; small ones may be very soft. Symptoms may be added by pressure. Neuralgia of the right arm was noted by Mackenzie. If the outflow of bile is impeded the usual symptoms follow; if the portal is occluded evidences of its obstruction appear in the spleen and stomach, intestines and hemorrhoidal area. Various glands enlarge and secondary tumors appear. Fever is usually present to some degree. The red cells decrease. In melanosarcomas the urine is brown from melanin.

**Prognosis:**—That of cancer—course slower in adenomas. Diagnosis begins with recognition of a tumor; the early cachexia, otherwise causeless, resisting well-applied roborant treatment, progressive emaciation, slight continuous fever, slight but persistent jaundice, all inexplicable and irremediable, speak for hepatic cancer when all other possibilities are excluded.

Treatment is that of cancer.

#### ECHINOCOCCUS CYSTS, ASCARIDES AND OTHER PARASITES

Single and multiple echinococcus cysts develop in the liver, and in their course follow that of hepatic abscess. The diagnosis rests on the patient's residence in an infected district, association with dogs, the presence of tenia in the stools, hepatic tumor with slight pain, tense and elastic, with a thrill, a smooth rounded surface, slow of growth and causing little disturbances, and the detection of the cyst elements on exploratory puncture. The treatment is surgical, but sulphide saturation might prove effective.

Ascarides, flukes and other parasites occasionally invade the liver.



## FATTY LIVER

The liver fat varies with the food. Normally from 3 per cent to 5 per cent, it may be increased to 40 per cent. Fat may be stored in the cells or the protoplasm may degenerate, or both may occur together. Only degeneration causes symptoms. A deposit of fat may be due to a diet too rich in fats, with sedentary life, warmth and deficient oxidation. The tendency to fat formation is as yet unexplained. Fatty degeneration is caused by poisoning with phosphorus, arsenic, antimony, copper, mercury and aluminum. Mineral acids act less markedly. Carbon monoxide, petroleum, chloroform, iodoform, ethyl bromide, nitrous oxide, phenol, phloridzin, ricin, abrin, morphine, phallin, some proteid toxins and spoiled corn, cause varying degrees of fatty degeneration. Chronic alcoholism, infectious maladies, chronic dysenteries and infantile gastroenterites, and phthisis, are destructive to the hepatic parenchyma. In phthisis the fat seems to be taken up from the rest of the body and deposited in the liver. The same thing occurs in many cases of cancer.

The liver is uniformly enlarged, light in gravity, the margin rounded and soft, the fat increased and the water lessened, the tint yellow, the vascularity as seen at autopsy lessened. The acini contain fat globules, and show the cell protoplasm unaltered in simple infiltration, degenerated in parenchymatous disease. Acute phosphorus poisoning shows only the former. In alcoholics the blood-serum contains much fat. Prolonged chloroform narcosis occasions cell necrosis. Many blood-poisons act on the protoplasm of the cells, while infections may cause inflammation.

In the fatty liver of obesity the organ is soft, the margin indistinct, the dull area enlarged downward, not tender or painful, a sense of pressure or weight may be present, with no portal or biliary stasis if uncomplicated. There are evidences of weak digestion—anorexia, flatulence, constipation, slimy stools, hemorrhoids and deficiency of bile. The general symptoms depend on the causal malady. The liver disease is a not especially important feature.

The diagnosis is easy when the malady is advanced so as to occasion recognizable enlargement. The soft, indistinct margin, uniform, with few and slight evidences of ill-health, and the presence of the causal conditions usually suffice to clear up the case. The prognosis depends entirely on the cause.

The treatment depends on the cause. Phthisis must be treated otherwise than by forced ingestion of fats.

## AMYLOID LIVER

Amyloid degeneration never affects the liver alone, but the kidneys, spleen, etc., as well. It seems probable that hyaline change is a precursor, and that amyloid substance is related to coagulated albumin. The most frequent precursor is suppuration of bone, including caries of bone and teeth, psoas abscess, necrosis, osteomyelitis and arthritis. We may also enumerate empyema, bronchiectasis, leg ulcers, hepatic abscess, pyelitis, gastric ulcer, dysentery; and in all these the presence of syphilis increases the disposition to amyloid change. Whether malaria, gout, rickets and mercury also increase the disposition has been claimed but not proved. Tuberculosis is the most frequent of all causes.

The entire liver is enlarged, its surface smooth, contour unaltered, tissue firm, waxy and translucent if as usual it contains little blood; the acini indistinct, the changes most manifest in the intraacinous capillaries. The application of iodine changes the color to mahogany brown, of a layer of waxy material under the endothelium. The liver cells are atrophied, or fatty.

Only decided degenerations can be recognized, and these require long periods of time. The liver is enlarged, the edges sharp and hard, smooth, neither painful nor tender, with no portal stasis as the vessels are not narrowed, but a little serum may exude into the peritoneum. The spleen shows similar hard enlargement. Casts, epithelium and enormous quantities of albumin are found in the urine, if, as is usual, the kidneys are involved. Diarrhea occurs with slimy stools. The original suppurative malady contributes its symptoms. The bile is gradually lessened, the stools becoming acholic, urea and uribilin decrease from the urine, which is light in color.

The prognosis depends on the causal disease. It is now known that amyloid infiltrations can be absorbed. The diagnosis is made by the painless, hard, smooth enlargement, absence of portal stasis, presence of suppuration, and the implication of the kidneys and other organs.

The treatment, prophylactic and direct, depends on the causal malady. The suppuration must be stopped and syphilis and other cachexia cured. Beyond this the treatment is symptomatic.

The liver iron is largely increased in pernicious anemia, and in that attending bothriocephalus; also in acute enteritis of children, typhoid and other acute fevers, phthisis, leukemia, diabetes, hyperemia of the liver, chronic diarrhea, atrophy, malaria, granular atrophy of the kidneys, artificial plethora, after large subcutaneous extravacations of blood, massive cellular hemorrhages and in hepatic cirrhosis.



In wasting of the tissues many red cells are destroyed and their iron stored in the liver. In any condition where red cells are lost this occurs. Why the liver cells alone take up iron, and in other cases only the capillaries store it, is unknown.

There are no specific symptoms beyond those of the primary malady. The existence of siderosis may be inferred but is not diagnosable during life. The treatment is that of the causal affection. When the anemia is due to absorption of intestinal ptomains the diet may be regulated, the bowels thoroughly evacuated and disinfected (Quincke). Since artificial siderosis recedes the pathologic form may be remedied by the free use of water and the vegetable acids and their salts, with natural fruit acids.

### PIGMENTED LIVER

Normal pigment is found in the aged and in atrophy. Bile pigments at times stain the liver cells. Rusty iron pigment has just been discussed. Brown pigment is seen in venous congestion. Malarial pigment is stopped in the capillaries and connective tissue. Melanin forms black granules in the cells of sarcoma. These phenomena are part of the history of the affections named.

Functional disturbances of the liver offer a field for the future clinician and pathologist. They may be assumed as following anomalies of digestion, disordered metabolism, infections and psychic disturbances. The symptoms of "biliousness" have little if any connection with this organ, but the intestinal decompositions on which they depend undoubtedly influence it at the same time. The whole subject is as yet "in the air."

### NEURALGIA OF THE LIVER

Violent spasmodic attacks of pain in the liver that can not be anatomically explained are set down as hepatalgias. The attacks resemble gallstone colic; last some days, in the worst forms. The patient is prostrated, excited, restless, pallid and collapsed, pulse small and irregular, rapid or slow. The pains may remain in the liver region or radiate. They may be increased by pressure over the liver, the gall-bladder, or other points. Vomiting is frequent, but never chills or fever. Jaundice is absent and the size of the liver is unaltered. The attacks may precede or accompany menstruation, occur nightly or recur in weeks or months. The causes may be menstrual, social, dietetic, or psychic.

Alcohol, spices, vinegar and tea have been blamed. The malady occurs in neurotics, anemics, especially in young girls. Other nervous phenomena are present or have been.

The cause may be irritation of the hepatic plexus, spasm of the bile ducts, or generally the manifestation of "reflex" irritation at the point of lowest resistance, the excitant being anywhere in the body. The diagnosis is made by exclusion. The treatment depends on the true cause, and this may be somatic or psychic.

### DISEASES OF THE PORTAL VEIN

By the portal vein are carried to the liver many noxious substances taken up from the bowel; hence the frequency of disease processes commencing in its terminal branches. The vein itself, however, is rarely diseased recognizably. Occlusion or narrowing may be caused by disease of the vein wall, compression from without, thrombosis, foreign bodies, and from unknown causes. Compression generally causes thrombosis. These pursue the usual course—become organized or disintegrate.

The symptoms of portal obstruction by thrombi develop suddenly, perhaps on the symptoms of preexistent disease. Sudden epigastric pain occurs, followed by vomiting, diarrhea, and hemorrhage from stomach and bowels. The spleen swells and ascites rapidly develops. The hemorrhoidal veins are distended, edema of the legs follows swiftly and the cutaneous veins of the abdomen dilate. A venous network and edema may surround the umbilicus. The liver decreases in size but this can rarely be made out except just after tapping. Jaundice is present if the thrombus obstructs the bile passages. The bile is reduced in quantity. Secondary arterial thrombi may form, intestinal infarctions, or peritonitis develop. Sometimes these acute symptoms subside and reappear, the thrombus contracting and accretions being deposited later. In case of narrowing the symptoms may develop gradually, and the case is differentiated from cirrhosis only by the rapid ascites and gravity of the hemorrhages. Digestion is notably disturbed, appetite lost, absorption obstructed, with constipation, relieved by serous diarrhea. The urine is scanty and may contain sugar. If only a branch of the portal is obstructed there may be no symptoms as the remainder of the liver carries on its function.

The condition may end in death in a few days or drag along for years, depending on the occlusion of the whole vein or of a branch. The prognosis is not good unless the malady is syphilitic. When the causal malady is amenable to treatment there is more hope.



The treatment is that of the primary disease, and of the symptoms. Even in non-syphilitic cases a persistent course of mercury and other absorbents may cause the removal of some of the obstructing debris.

### PYLEPHLEBITIS

The wall of the portal vein may undergo degenerative processes. Gall-stones and other foreign bodies, syphilis and tuberculosis, may cause irritation; leading to constriction and thrombosis.

Acute inflammation may be caused by some foreign body, or extension from intestinal ulcers or other suppurative foci, anywhere in the portal roots. The process is directly due to bacterial infection. The vein is occluded by the inflammatory products and embolism results. Secondary foci are formed which may be septic or not.

The symptoms begin with thrombus formation. Septicemic fever and other manifestations are presented, and sometimes local evidences of the malady—pain in the cecum and spleen, swelling of the spleen, hyperemia of the liver and secondary abscesses. Jaundice is sometimes present in varying degree; from pyemia, stasis or inflammation of the bile ducts. Local peritonitis may be present and develop into the general form. The disease usually runs too acute a course for stasis symptoms to appear, unless it is near to the end. The urine is scanty and may contain albumin or indoxyl.

The course is uncertain as its beginning can not be fixed. The primary attack may subside and pyemia develop in some weeks, enduring for weeks longer or months. The diagnosis is made by the symptoms of pyemia with hepatic abscess. Local symptoms are more common in chronic forms. The prognosis in unmistakable cases is hopeless, as a rule. If the primary focus is accessible and curable the inflammation may subside if not gangrenous.

The treatment is that of the primary malady and usually surgical. The abortion of suppuration by the sulphides, reinforcement of leucocytes by nuclein, the toilet of the intestinal canal, and the careful support of the patient's strength, are indicated.

## X. DISEASES OF THE SPLEEN

### DISEASES OF THE SPLEEN

**Splenoptosis:**—The spleen may be dislocated by descent of the stomach, by relaxation of its supports, or by increase in its weight.

Injuries may force it down, or the pressure of the corset displace it. Percussion and palpation detect the organ in its abnormal situation, even in the pelvis. It may be loose or adherent. The shape distinguishes it from a fecal mass or a wandering kidney, as well as the absence of the dislocated organ from its normal situation. Pain is absent as a rule, unless the pedicle is twisted, when inflammatory symptoms arise. The ureter, bladder or bowel may be compressed. If distress arises a supportive bandage may give relief, or the organ may be attached to the abdominal parietes by stitches.

**Rupture of the Spleen:**—This may be caused by violent injury or occur in the course of malarial or typhoid hyperemia, tumor or abscess. The symptoms are those of severe peritoneal hemorrhage, collapse and local spreading inflammation. Treatment is surgical.

**Hyperemia of the Spleen:**—An acute hyperemia occurs in malarial, typhoid and some other infections, suppressed menstruation, and beginning acute splenitis. The organ is engorged, soft, dark, the capsule tense. Chronic or passive congestion accompanies portal obstructions. Interstitial changes ensue in time. Hyperemia may cause a sense of fullness, tenderness or pain; the lower border may be palpated and the spleen is enlarged. The treatment is that of the causal malady, the bowels being at once freely acted upon, and the tension relieved by bleeding, pilocarpine, veratrine, or ice over the spleen. A small enema of cold saturated salt solution actively depletes the abdominal viscera. The intense vasomotor spasm of chills is soon relaxed by a full dose of atropine or of pilocarpine, hypodermically. The former is indicated when collapse threatens, the latter if the inflammatory symptoms approximate the sthenic type.

**Acute Splenitis:**—This may arise from injury, acute infections, embolism, or extension from other organs. The pain depends on the participation of the serous coat, which may also occasion friction recognizable by palpation and auscultation. The inflammation may be limited to the serous cover. The treatment is that of the cause, and of inflammation in general; depleting enemas and cathartics, vasomotor relaxants, local applications, etc. Sulphide saturation may prevent or abort suppuration.

**Chronic Splenitis:**—Indurations form around infarctions, and follow congestions. Cases are supplied by malaria, syphilis, leukemia, pseudoleukemia and typhoid fever. The spleen may be enormously enlarged. On section the surface is pigmented, the capsule hyperplastic, and the connective generally extended, the pulp cells increased in size and number. In time the connective encroaches upon and replaces the cells,



the induration increasing. The symptoms are caused by the increased weight and size—dragging and pressure, bowel obstruction, pain when lying on the right side; and the tumor, notched, with blunt borders, slightly movable with respiration, devoid of pain and tenderness. Dyspnea, palpitation and anemia attend. The treatment is that of the causal malady. Syphilis demands mercury biniodide, leukemia and malaria quinine arsenate and berberine. Polymnia uvedalia has reduced the enlargement when regular means failed, but probably depends on berberine for its activity. The latter may be given in doses rising to full toleration, for many weeks.

**Abscess of the Spleen:**—Septic emboli from the heart sometimes lodge in the splenic vessels. Less frequently emboli come from other sources, or suppuration results from perforation by peptic ulcer, or from trauma. Swelling occurs, with pain, tenderness, and the constitutional evidences of suppuration. The abscess may be single or multiple, partial or general. It may discharge into any part of the gastrointestinal tract, the pleura or the peritoneum. Death may occur suddenly from rupture, hemorrhage or peritonitis. The tumor is lower than in empyema, and follows suppuration elsewhere. The history does not point to the thoracic organs. Aspiration confirms the diagnosis. Fecal masses are movable, with constipation, can not be palpated as readily, and are attended with digestive disorders, perhaps vomiting and tympanites. The treatment of splenic abscess is by preference surgical. Otherwise we may abort by sulphide saturation, with free catharsis and enemas of saturated salt solution or glycerin.

Embolism may occur in ulcerative endocarditis, pyemia and other infections. Benign emboli cause hemorrhagic infarctions, or these may result from thrombosis. The symptoms are uncertain but there may be chills, fevers, and local evidences of inflammation suddenly developing.

Amyloid change may accompany that degeneration in the liver and kidneys. The enlargement is smooth, hard, with rounded edges. This rarely follows chronic suppuration of bone (including dental caries), syphilis, tuberculosis and chronic enterocolitis. There are no symptoms attributable to the spleen except its enlargement. Enormous quantities of albumin are discharged with the urine. There is no known treatment except removal of the causal suppuration, when the malady may subside.

Atrophy of the spleen follows connective hyperplasia, mostly in syphilitic forms. The only symptom is contraction of the organ.

Tubercles, gummata, carcinomata and sarcomata developing in the spleen are usually overshadowed by similar developments elsewhere.

*Echinococci* may be distinguished by the aspirator and the absence of chills, fever and leucocytosis.

Aneurism of the splenic artery is very rare. Diagnosis depends on the recognition of pulsation and bruits; the existence of pressure symptoms, and the location. The treatment is that of aneurism in general.

Splenomegaly has been treated under the name of pseudoleukemia.

## XI. DISEASES OF THE PANCREAS

### DISEASES OF THE PANCREAS

The pancreas is so situated that diagnosis of its diseases is extremely difficult; they are rarely amenable to treatment, and even the autopsy is usually unable to determine their true nature as the gland is generally destroyed.

**Hemorrhage:**—This may be caused by penetrating wounds or contusions over the pancreas, cancer, fat-necrosis, cysts, arteriosclerosis, aneurism or thrombosis of the pancreatic vessels, scurvy, purpura, pernicious anemia or some acute infection, obstruction of the circulation from phosphorus poisoning, passive congestion from cardiac disease or portal obstruction, or by acute inflammation. It has been noted more frequently in men, after the 30th year. The organ is infiltrated with blood, disorganized, attacked by bacteria, and shows areas of necrosis. The neighboring parts may be involved. Cirrhosis may be found, and the ducts and acini are obstructed with blood cells. The entire gland may be destroyed or only the head or tail. Blood may be extravasated about the kidney.

The symptoms accredited to this accident are sudden, stabbing pain in the pancreas, persistent vomiting, dyspnea, great restlessness, and the signs of collapse—cold skin and extremities, cold sweat, weak thready pulse, sighing, pallor, aphonia, etc. The bowels are constipated. Tenderness may be elicited about the umbilicus and to its left. The temperature falls below normal. The mind is unaffected until terminal coma supervenes. Zenker attributes the sudden death that generally occurs to depression of the solar plexus. If death is postponed the temperature rises and tympanites obscures the dullness. Suppuration or gangrene may follow if the patient lives long enough. That recovery sometimes occurs is shown by evidences of an attack having been detected at post mortems. The diagnosis is surmised from the sudden and severe attack, and its location. Gastric or intestinal perforation is preceded by evidences of an ulcer, while the location and character of



the pain distinguish intestinal obstruction and gallstone colic. The treatment is surgical and palliative.

**Acute Hemorrhagic Pancreatitis:**—Inflammation following hemorrhage enlarges the gland, whose lobules are filled with blood and surrounded with areas of fat-necrosis. If time allows the cirrhotic process follows. The symptoms are those of hemorrhage followed by tenderness and fever, local swelling, deep-seated induration, stiffness of the abdominal parietes and tympanites.

Suppuration may cause single, multiple or general abscess of the gland, and perforation may occur into the stomach, duodenum, or peritoneum. Pyelophlebitis and thrombosis sometimes ensue. The symptoms are those of pancreatic inflammation with sepsis, chills or rigors, fever, sweating, delirium, and active leucocytosis. Jaundice or glycosuria may attend. The attack is attended with symptoms as above described, somewhat less acute. Treatment is surgical, the malady being too rare for observations on modern therapeutic methods to have been made.

Gangrene sometimes follows hemorrhage, abscess, traumatism or perforation by peptic ulcer. In two cases the gland was discharged by the rectum, the patients recovering (Chiari). It is needless to remark that such a result is scarcely to be hoped.

**Chronic Pancreatitis:**—Catarrhal disease may extend from the duodenum along the pancreatic ducts, causing connective hyperplasia with induration and atrophy of the glandular tissue. Calculi and pigment may be deposited. This may appear during diabetes, syphilis or alcoholism, or fat deposits may be present. The whole gland may enlarge or be atrophied.

The hard gland may be taken for carcinoma.

Cirrhosis may be general or partial. It is one of the curiosities of the post-mortem table.

**Pancreatic Fat-necrosis:**—Flexner produced fat-necrosis by injecting pancreatic pulp into fatty tissue, and Williams likewise produced the affection in the skin. Tuttle found this affection attending interstitial fibrosis with artery disease. The gland cells may be atrophied, or the necrosis be limited to the interlobular and subperitoneal fat. The mesentery, omentum, epiploic appendices and abdominal fat may show similar necrotic areas. Hemorrhage may follow, or gangrene, sometimes ending in cysts. Diagnosis during life has not been made. The malady may not affect the health.

**Carcinoma:**—Scirrhus and colloid may occur primarily; usually beginning in the head, and spreading to contiguous viscera or by the

lymphatics to the liver, etc. Or it may be secondary to gastric and other cancer. Pressure on the common gall-duct causes jaundice; nausea and vomiting are frequent, cachexia is marked and emaciation rapid. When the tumor becomes palpable pulsation may be imparted to it by the aorta. There may be fatty stools, glycosuria, salivation, or ascites. Paroxysmal pains are sometimes present. Aneurism is distinguished by its expansile pulsation and bruit; pyloric cancer by its movability, the presence of gastric dilatation and the absence of jaundice; also of the characteristic pain some hours after meals. Cancer of the transverse colon is more movable, and causes intestinal obstruction. Pancreatic sarcoma and syphilis have not yet been diagnosticated from carcinoma. The treatment is surgical.

**Cysts:**—These are rare, most cases having been found in adults. The causes are injuries, occlusion of ducts, and in some cases are untraceable. The pancreatic tissue may proliferate, the occluded duct enlarge, the cyst giving rise to hemorrhage into the lesser peritoneum or crowd the stomach up and the colon down, or the latter up also. Sometimes it lies above the stomach. Railton found a cyst arising from the tail, in the region of the left kidney. The cyst moves slightly with respiration. It may hold a few ounces or quarts. It may empty into the bowel and refill. Salivation, dyspnea and jaundice have been observed in some cases. Growth is slow with few symptoms until the size causes pressure effects. It presents a smooth, deep-seated tumor in the left hypochondrium or hypogastrium, fluctuating if not too tense. Thompson found in one case intermittent tympanites from the entrance of intestinal gases. The stools may be acholic, rarely contain fat; glycosuria is common. The fluid removed by aspiration consists of pancreatic juice. This completes the diagnosis, which may be inferred from the location of the tumor, emaciation and glycosuria. Treatment is surgical.

**Calculus:**—The formation in the ducts resembles that of biliary calculi; from catarrh and probably infection. The calculi are single or multiple, white or gray, composed of calcium carbonate with some phosphate; from a point to a walnut in size. They may cause cysts, atrophy or cirrhosis, ulcer, inflammation or suppuration. They may be the starting point of carcinoma. Attacks resembling biliary colic may occur, or there may be no appreciable symptoms. The pain and tenderness are deeply seated near the umbilicus; the stools may be fatty, or contain the calculi. If the main duct is closed emaciation follows. Glycosuria may attend. Diagnosis has not been established, or treatment preconized.



## XII. DISEASES OF THE PERITONEUM

### ACUTE PERITONITIS

Peritonitis may be primary or secondary, partial or general, adhesive or serous. The surface of this membrane almost equals the skin in extent, and absorption from it is rapid. The membrane is injected, more or less glued together by lymph, the effusion being fibrinous, sero-fibrinous, purulent most frequently, or in cancer or tubercle hemorrhagic. The coats of the bowels are edematous, their mucosa catarrhal. The inflammatory process and products may be circumscribed by adhesions shutting them off from the general peritoneal cavity. In fact, the changes are closely similar to those described under the head of pleurisy.

**Etiology:**—The causes are pyogenic bacteria, entering through perforations; specific organisms such as the tubercle bacillus, streptococcus pyogenes, staphylococcus pyogenes aureus and albus, bacterium coli commune, pneumococcus bacillus of Friedlaender, b. pyocyaneus, typhosus, and proteus, gonococcus, aerogenes capsulatus, and anthrax bacillus, separately or variously combined; chemical irritants, mechanical, such as hernia; extension of infective processes; and very rarely it occurs primarily from exposure to cold and wet.

**Symptoms:**—In perforations we have a sudden, sharp pain developing at the point of injury, continuous, increasing in severity and spreading from the first point, increased by any movement and by pressure. Vomiting soon follows, often spontaneous, of greenish liquid with mucus. In markedly asthenic cases there may be little pain and no vomiting, but coma. Constipation is usual, eructations and hiccup are common, or diarrhea may follow implication of the intestinal mucosa. The tongue is coated, becoming dry and brown with the fever. The heart is pushed up by effusion. The attack may be heralded also by a rigor, with intense shock, and fever develops rapidly, going to hyperpyretic points as the inflammation extends. The rectal temperature may be highest. The curve may present the peculiarities of suppurative fever. Respiration is rapid and shallow, the heart weak, the pulse rapid and small, growing more so toward the last. The face is contracted and pale, the lips and extremities cyanotic. The patient lies supine with legs drawn up. The urine is scanty and concentrated. Delirium and stupor are unusual. In the asthenic form the patient is overwhelmed, the temperature subnormal, the pulse excessively weak. The abdomen becomes distended as effusion is poured out, and the bowels may be

palsied. If the abdominal muscles are stronger the effusion is less, and the abdomen is tense. The heart and diaphragm are pushed up. Tenderness is extreme, worst about the umbilicus. Friction sounds may be detected early. Tympany is exaggerated at first, the liver dullness less, fluid effusion causing dullness later, in dependent parts.

Asthenic cases die within a week; the sthenic within two days. Death may be due to shock, or heart failure. The prognosis is better in primary cases, and in perforation if surgical intervention is prompt.

In children peritonitis may be due to syphilis (congenital), to sepsis from the cord, to trauma or to appendicitis. The child utters only short cries suppressed by pain, digestive features are less prominent, tympanites marked, convulsions common and fever very high.

**Localized Peritonitis:**—The inflammation is confined to a part of the serosa only, covering a single organ, as perihepatitis, perisplenitis or perinephritis. It may be due to cancer. (See Appendicitis.) Subphrenic pyopneumothorax is a peritoneal abscess containing air, between the liver and diaphragm. Perimetritis is the most common form, due to extension from the uterus, tubes or ovaries. Gonorrhea, puerperal sepsis and tubercle are causes. Abdominal or pelvic muscular rigidity attend it.

The symptoms differ merely in their localization, the general conditions depending on the extent of the surface involved. Rigors and other septic symptoms depend on the quantity and virulence of the material absorbed into the blood. Extension to the general cavity follows discharge of the circumscribed collection into it.

Diagnosis depends on the evidences of local inflammation, constant and often sharp pain, excessive tenderness as compared with inflammation, of the organ underneath, without disturbance of its functions unless it is also involved, and the evidences of septic absorption. Adynamic forms present most difficulty but may be recognized from a study of the history. Hysteric peritonitis shows tenderness exaggerated as compared with general symptoms, usually no fever, but other evidences of hysteria. Perforation occurring in typhoid fever should be easily recognized if the case has been closely watched. In intestinal inflammations there are less tenderness, less fever, colicky pains, not constant, and diarrhea. In colic there are flatulent distention, borborygmi and no fever or other peritoneal symptoms. In abdominal myalgia the pain is on motion only, superficial, and detectable by contracting the affected muscles with a faradic current. Pleuropneumonia may resemble peritonitis but there are earlier rapid respiration and high fever, with the physical signs. Rupture of a tubal pregnancy in fact causes peritonitis and hemorrhage.



Rupture of an aneurism or an embolism of the superior mesenteric artery causes hyperacute symptoms with quick collapse.

The prognosis is better than in general forms. Recovery may be only partial, possibly leaving adhesions which may work further distress and peril.

**Treatment:**—Absolute rest and quiet should be enjoined. The diet should be of small quantities of the richest and most readily digested foods, giving every two hours two to four ounces of *café au lait*, bovine, sanguiferrin, fruit juice, or one of the predigested foods or a raw egg, white or yolk as may be preferred. Raw scraped beef or grated oysters may give the maximum of nutrition with minimum of bulk. In asthenic forms nutrition must be pushed. In others the brief duration of the attack may save us disturbing the stomach and inducing vomiting by unwise efforts to feed. In acute cases an absolutely empty bowel is best.

Anders says it is now conceded that nothing is to be gained by surgical interventions in mild cases of gonococcal, colon bacillus or pneumococcal infections. In this inflammation at least the profession is united as to the value of promptly emptying the bowels by salines and thus stopping the absorption of toxins from the intestinal nursery. The engorged abdominal vessels are also depleted, absorption favored from the inflamed tract, the danger of adhesions decreased, and the absorption of nutritive element furthered. The action is enhanced by the use of exosmotic enemas, half pints of saturated salt solution every four hours, the saline laxative being given between. In sthenic cases calomel may precede the latter, giving gr. 1-6 every half hour till six doses have been taken. Speedy saturation with calx sulphurata, gr. 1-6 every quarter hour, and by nuclein solution, gtt. 10 every hour, dropped on the tongue, is imperative. Only in perforative forms is morphine indicated and then peristalsis should be prevented by full hypodermic doses.

The dosimetric and defervescent triads are indicated in sthenic and asthenic forms, to control the fever and regulate the pulse. It is useless to seek to assuage the pain by opiates—narcotism will supervene with the agony unrelieved. Locally, heat and cold are the only remedies chosen—in appropriate cases. The hot should be very hot, the cold very cold, to secure benefit.

Tympanites will scarcely be troublesome if the bowels are kept clear and drained, but if it does prove annoying a turpentine enema and a few granules of physostigmine will give relief.

In perforation the abdomen should be opened as quickly as possible, cleansed and the opening closed.

## CHRONIC PERITONITIS

General peritonitis may be adhesive, following acute local forms, proliferative, thickening without adhesion occurring with organic cirrhoses; cancerous with bloody or chylous exudate; tuberculous, the most important form, with bloody effusion; hemorrhagic, a form described by Virchow, and following frequent tapping. Local forms accompany disease of the various abdominal viscera, the spleen, liver and appendix, causing firm adhesions.

**Symptoms:**—The general form develops insidiously, with digestive disturbances, usually constipation, diarrhea in tubercular forms, and sometimes symptoms due to pressure exerted by adhesive bands upon the portal vein, portions of intestine, etc. There may or may not be pain in the abdomen. Obscure abdominal discomforts may be present. General symptoms are likewise vague and indeterminate. Hectic results from sepsis, with wasting and debility, and nervous phenomena. The underlying malady may afford some symptoms. The abdomen may project where collections exist, fluctuation may be elicited over fluids, with dullness on percussion. Friction, fremitus and sounds may be detected. Local forms are frequently latent, colicky pains being the most common symptom when any are present. Examination may detect local collections of fluid. Strangulation may be caused by obstructing bands.

There is a form of serous peritonitis occurring in girls at puberty that closely resembles latent tubercular forms. The latter usually present more fever and rapid emaciation. The history may clear up the mystery, or inoculations of guinea-pigs with the exudate demonstrate its nature.

Mild forms may recover after a chronic course, resulting in extreme debility. Tubercular cases may recover spontaneously or after surgical intervention, especially if the fever is slight.

**Treatment:**—Begin with regulation of the sanitary conditions, the diet being extremely nutritious, the digestion aided in all possible ways. Flatulence causing pain, is to be prevented by excluding gassy foods and keeping the alimentary canal in good order. Exosmotic enemata keep the lower bowel clear, salines and physostigmine prevent accumulations in the upper intestines. Suppuration is to be combated by calx sulphurata and nuclein, fever by the dosimetric and defervescent triads, the strength sustained by the tonic arsenates of strychnine, iron and quinine, and the absorption of effused material promoted and adhesions removed by the use of the potent absorbent combination so



frequently advised in this work. Other indications are to be met as they arise.

### ASCITES

The direct cause of accumulation of serum in the peritoneal sac is obstruction of the portal vein. The fluid is blood serum, straw colored, brown in cirrhosis, bile tinted in jaundice, or blood-stained, s. g. 1010 to 1014, clear or opaline, usually alkaline. It contains albumin, more in peritonitis, leucocytes, red blood cells, fat, endothelium and cholesterolin. In chylous ascites the fluid resembles milk and contains fat, lymphocytes and sugar. In ascites adiposus the fat originates from degenerated epithelium and there is no sugar. In old cases the pressure causes atrophy of the abdominal viscera.

**Etiology:**—The flow of blood from the portal vein may be hindered by pressure in the liver, as in cirrhosis; pressure outside the liver, as by various tumors; portal thrombosis; pressure on the inferior cava, the hepatic vein or the lymphatics; chronic obstructive pulmonary conditions, as emphysema; peritoneal neoplasms; portal atony from albumin drain and impaired nutrition, as in cachexias; chylous ascites from lymphatic leaks or filariae, or from unknown causes; and adipose ascites may occur from fatty degeneration, as in cancer and tubercle.

**Symptoms:**—When a quart or more has been effused the patient begins to complain of a sense of weight or fullness, progressive, followed by dragging in the loins, disturbed digestion, flatulence, constipation, with dyspnea as the diaphragm is pressed up. The latter is increased by exertion or by lying down. The heart is pushed up and may be irregular. Syncope occurs frequently. Pressure on the bladder irritates it and micturition is frequent, the urine scanty and albuminous.

The dependent portion of the abdomen projects, this changing with change in posture; the skin is tense, smooth and shining; the umbilicus pouches out; superficial veins are prominent; the thorax appears small above and distended below, the xiphoid cartilage curled out; breathing is hurried and thoracic. Fluctuation may be elicited, and a wave sent across the abdomen by tapping against one side. Percussion dullness is manifest over the fluid. This changes with posture but the presence of distended bowel prevents an absolute hydrostatic line being demonstrable.

**Diagnosis:**—It is made by the history and the signs. Fluctuation shows the presence of fluid, its movable nature shows it to be free in the abdominal cavity, and the aspirator reveals the nature of the fluid. The history shows previous bad health, disease of the liver, lungs or heart.

the swelling commences below and is alike on both sides, more apparent on standing. The prominence flattens on lying on the back, the umbilicus protrudes, fluctuation is general, horizontally and vertically, there is no aortic pulsation, the uterus is movable and a pouch may project into the vagina, when standing the dull line is tolerably regular and concave, when lying on the back the flanks are dull with tympany in front, the dullness shifting with change in the patient's position, and the ascitic fluid is clear, with s. g. of or below 1014. In ovarian cyst we find a history of previous good health until the tumor develops, dysmenorrhea but no organic disease of liver, etc., asymmetric enlargement at first, the umbilicus never bulges, fluctuation circumscribed, sometimes aortic pulsation, displaced uterus and the cyst may be outlined by vaginal examination, the upper line of dullness convex when standing, dullness in front when lying supine, not shifting on change of posture, and the fluid has a s. g. of 1018 or more, is thick and turbid. Pancreatic and hepatic cysts arise from above, and may be distinguished by the aspirator. Peritonitic effusions have a history of acute inflammation or trauma, pain is marked, the abdomen is irregularly prominent, never flat, fluctuation may be limited, palpation detects uneven prominences, dullness may not change with posture, and the fluid is heavy, viscid and its color variable. That the bladder has been tapped for ascites does not show that the diagnosis presents any difficulty but that there are very careless doctors. The malady generally depends on chronic, incurable diseases and the prognosis lies with them.

**Treatment:**—Let us premise with the statement that the object of treatment is not so much getting rid of a few pints of effused serum as it is prolonging the life and promoting the comfort of the patient. The original underlying disease should be treated, and the nutrition and blood crisis maintained sedulously. All dropsies demand the strict limitation of the ingestion of fluids, with richly albuminous diet, so that the nourishing elements of the blood may be concentrated in the smallest bulk, and the pressure in the vessels thereby diminished. So also we find that abstraction of the effused fluids removes counter-pressure and is followed by freer drain of blood serum into the abdominal cavity and consequent loss of blood albumin and fibrin. As Niemeyer acutely observed, we will do more by giving iron and other tonics and letting the dropsies alone than by exhausting our patient's strength in endeavoring to drain away the effused serum. Give iron phosphate gr. 1-6, calcium lactophosphate gr. 1, and berberine gr. 1-6, together, every two hours while awake. Iron increases the richness of the blood, the lime increases the strength of the cell walls and hinders the escape of



serum, and berberine increases the tonicity of connective tissues and aids the others thus. Let this be the standing treatment, with such additions as the symptoms indicate from time to time. Keep the bowels clear and clean, best with exsmotic enemas of saturated salt solution. The dry diet may be made exceedingly strict as the patient realizes the comfort ensuing, but must not be pushed to denutrition. In our enthusiasm for reform we need not kill our patient.

Why should we seek to remove the fluid at all? It may so disturb the heart and induce dyspnea that some relief is essential. Then we may secure this by tapping and abstracting a little—half to one pint—of the effusion, just enough to give comfort. This does not drain away the strength as a full evacuation does. Or if the patient can bear depletion well we may employ the "vegetable trocar," apocynin, giving gr. 3-12 every two to four hours until free catharsis is established; guarding well our patient meanwhile from the water cooler. Then in some cases tapping has actually proved a cure, as Roberts has shown, in hepatic cirrheses, so improving the abdominal circulation as to allow a *modus vivendi* of the conditions to be established, or the original causative malady having stopped short of the mortal point. In old cases where tapping has to be repeated at very frequent intervals the writer has obtained good results in the way of comfort from the insertion of Southey's tubes, for permanent or continuous drainage of the peritoneum. The tubes should drain by a long rubber pipe into a bucket of water to prevent the access of air. Masses of coagulated lymph form at the peritoneal opening and in a few weeks occlude the tubes, necessitating placing them in new situations; but this is the only evidence of irritation we have ever noted. As such patients usually live in a chair, the mechanical arrangements are not difficult. Perfect asepsis is to be maintained.

## PERITONEAL TUMORS

Carcinoma occurs as scirrhus, encephaloid and colloid, the latter usually in the omentum. Primary forms are rare, cancer of the liver, stomach or pelvis preceding. There may be many little masses or a few larger ones, the colloid being the largest growths. They are more common in women, elderly. Early symptoms are obscure in primary cases, consisting of local pain and discomfort, and the constantly increasing cachexia. Some fever occurs, with wasting, debility, and anemia. The nodules may be detected by palpation if there is not too much ascites. This is often absent in colloids, which fill the cavity with large, soft, non-fluctuating masses. In secondary forms we have the

original formation in the stomach, liver or pelvis, with the addition of abdominal pains and ascites. There may always be found some fever in cancer cases, due to the inflammation excited, the absorption of an internal toxin, or of septic matter due to the necrosis. For a part of every cancer consists of tissues whose circulation has been choked off by compression of the nutrient vessels. When the ascitic distention does not prevent, the irregular nodules of carcinoma may be detected by palpation. Tubercular growths occur earlier in life and do not cause such marked ascites as cancer. The inguinal glands are affected in cancer. Proliferative peritonitis is of alcoholic antecedents. Hydatids have a different history, the fremitus, slower growth, less pain and cachexia, and the hooklets may be detected in the fluid. Intestinal cancer causes intestinal obstruction, colic and bloody stools. Retroperitoneal sarcomas cause obstruction of the bowels, neuralgic pains and edema of the legs, from pressure. They are not movable like peritoneal tumors, which shift with respiration. Exploration completes diagnoses.

Fibromas occur in little nodules, lipomas as fatty masses in or under the peritoneum. Mixed forms are found. They are rarely diagnosed, but may be removed if early detected.



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## PART VII

# DISEASES OF THE GENITO- URINARY SYSTEM

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### I. DISEASES OF THE URETHRA

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#### GONORRHEA

Acute Anterior Gonorrheal Urethritis is an acute purulent inflammation of the urethral mucosa resulting from infection by the gonococcus with or without staphylococci or streptococci. When the latter bacteria alone are present the disease, though apparently severe, is *non-specific* and may be easily controlled by the local use of non-injurious germicides. In the ordinary (and specific) case in from one to four days after intercourse there occurs an itching or tickling at the meatus and a reddish blush will be noted at the orifice. Some pouting will be also often present. Within thirty-six hours either an opaline mucus will cover the meatus or there will occur a discharge. The redness and swelling increase and sharp sticking pain is complained of. Smarting occurs on urination and there is a constant increase in the discharge. At the end of the third day the symptoms are marked and there often exists considerable lymphangitis. A tight foreskin may become edematous and phimosis result, or paraphimosis may complicate matters. The patient may have chordee at night and suffer bitterly from ardor urinæ. There is, moreover, a desire to micturate frequently. The lymphatics from the frenum to the groin may be inflamed, swollen and painful. By this time the comparatively slight and glairy discharge has become plentiful and mucopurulent. It may, even, by the end of the first week, be streaked with blood. The stream of urine is thin, often twisted or forked, or it may be voided drop by drop or in intermittent gushes. In a virulent case of gonorrhea the entire urethra may be within the week affected to the bulb and the corpus spongiosum assume the aspect of a cord-like tube. The follicles become indurated and may be felt as hard pea-like nodules along the urethral floor. Adenitis, cowperitis (infection of Cowper's glands) and periurethral abscess may



complicate matters. Hemorrhages may occur after urinating or spontaneously. In the average case however we find merely a moderate degree of inflammation, a plentiful discharge, painful erections (chordee), decided ardor urinæ and a slight rise of temperature. In diagnosing the physician must bear in mind that every case of gonorrhea varies in its severity and a profuse discharge with moderate ardor urinæ and but little inflammation is not infrequent. He should also make it a point in any doubtful case to have the discharge examined for gonococci, as it is quite possible for a profuse purulent discharge to appear within twenty-four hours after instrumental infection, etc.

The height of the acute stage is usually reached about the twelfth or fourteenth day. At this period, even in mild cases there is a sense of discomfort at the bulb and the pendulous urethra is extremely sensitive. Walking becomes painful and the patient "straddles." Pain in the testes and groin may be present. It is now if ever that the patient begins to show facial signs of the disease. He suffers while urinating; he finds it distressing to walk and more uncomfortable to sit down. At night chordee makes sleep impossible and as a result the face assumes a worn, haggard look. The temperature now will range from 100° to 102° F. The discharge is generally more profuse in the morning; this is due partly to retention of the discharge and partly to the fact that there is a decided exacerbation at night. However, patients who keep to their beds have decidedly less trouble and discharge. If there has been any reasonable treatment, about this time the whole train of symptoms improves: redness and swelling subside, the discharge, while copious, loses its purulent character and gradually becomes milky, then mucoid. Finally the amount diminishes until either none is discernible or the familiar "morning drop" alone remains.

The usual length of an attack of simple anterior urethritis is from three to five weeks; but under appropriate treatment, initiated early, the disease can be cured in from ten to twenty days. If, however, on presentation the disorder has existed for a week or ten days, the treatment will be prolonged. Relapses are not infrequent and usually occur just as the discharge seems to have ceased. This is due to an infection of the lacunæ or deeper structures. Sometimes these recurrences are easily controlled but occasionally they are more rebellious to treatment than the initial attack.

**The Examination of Urine:**—In every case of urethritis the urine should be examined. In the very early stage this is clear and small bodies of suety appearance or like small pieces of broken rice will be found. If these are not present threads will be. This condition !

but for a day or two and then the urine becomes more or less opaque. If the first few ounces of urine are passed into a clean glass and the rest into another vessel the first urine will be cloudy and the second specimen clear. This is the "two glass method" and proves the infection to be limited to the anterior urethra. If the infection has reached the posterior urethra or bladder the two specimens will be clouded. It is at this very early stage (prior to penetration by the gonococci to the epithelial layer) that steps may be taken for aborting the attack. Late in the first week or early in the second the urine becomes loaded with pus and debris. If allowed to stand the pus will settle to the bottom of the vessel and a layer of yellowish or greenish material, over which a cloud-like mass of mucus shreds floats, will be apparent. As the case improves the pus lessens but the mucus increases. Then both lessen and epithelial cells present, showing that reparative processes are going on. Finally even these cease and, if no morning gluing of the meatus occurs, the case may be deemed cured. In the declining stages of an acute attack the "two glass method" is of no value and it is necessary to irrigate the anterior urethra and then have the patient pass urine into a clean vessel for examination. If this shows gonococci or gonorrheal shreds the bladder or deep urethra are infected. If the washing from the anterior urethra reveals gonococci and the first urine does also, it means that the infection has spread to the bulb. The residue (which will have passed from the bladder through a flushed urethra) may show nothing pathologic or may be loaded with pus and epithelium. In the latter case it is quite evident that the bladder is involved.

**Diagnosis:**—Balanitis, in cases where there is an abnormally tight prepuce, may resemble urethritis as the parts are inflamed and infiltrated and a discharge exists. An examination of the pus with a microscope will reveal gonococci if gonorrhea is present and, if the foreskin is retracted, the glans washed and the first inch of the urethra irrigated, no pus will be found further in the canal. In cases of "pin-hole meatus" it is best to do a meatotomy so as to be able to get into the urethra. In some few cases a chancre may exist just within the meatus and set up symptoms like gonorrhea. The microscope and urethral speculum will settle the point. The discharge is, in these cases, muco-purulent and scanty, and the lesion can usually be felt. These conditions excluded, the physician cannot fail to recognize urethritis. The specific character of the disease must be proven by the microscope.

The prognosis in any case of anterior urethritis is good, but if the symptoms of posterior involvement become marked the patient should be warned that the disease may prove tedious. It should always be



borne in mind that epididymitis, cystitis or gonorrheal arthritis may develop even under the best care. Alcoholic and neurotic patients are likely to prove refractory as are also persons of rheumatic, tubercular or strumous tendency.

**Treatment:**—Of necessity this varies according to the stage of the infection. Within the first twenty-four hours an attempt may be made to abort the process. The patient should urinate and the doctor should introduce into the urethra a soft rubber catheter and, shutting off the canal behind by pressure with finger and thumb, irrigate the proximal portion for some minutes with a 1-1000 permanganate solution. Then the next inch may be so treated and finally a retrojection catheter may be inserted for a few inches and the process repeated. A 1-3000 solution of silver nitrate may be employed with even better results. A soft bougie containing largin or ichtargan may then be inserted and retained till the next urination or irrigation. This serves to distend the urethral walls and constantly apply medication. Of late these bougies are prepared with a soft cotton core which, also, is saturated with a gonococcide. This medicated "core" drains the urethra by capillary action and also serves as a dilator. In acute gonorrhea, after lavage as above, a few drops of a weak cocaine solution should be injected into the canal before the bougie is inserted. Take pains to maintain asepsis.

The patient should receive a purge (small doses of calomel and podophyllin followed by a saline) and be placed on gr. 1-3 of calcium sulphide every hour for forty-eight hours. Helenin gr. 1-6 and boldine gr. 1-12 may be given with barley water every four hours. Aconitine gr. 1-134 may be added to each dose for fever.

A much more painful process (though often a more positively curative one) is the irrigation of the urethra with a warm saturated solution of boric acid after urination. A urethral speculum is inserted and with a cotton-wrapped probe or applicator the infected mucosa is swabbed with a solution of silver nitrate, gr. 15 to the ounce. Great care must be taken to prevent an excess of the solution from entering the urethra. In cases which respond satisfactorily there will be a considerable amount of inflammation and discharge, and the patient should remain in bed for two or three days. The purulent character of the secretion gradually ceases and a thin watery discharge (perhaps slightly streaked with blood) takes its place. In some cases it is necessary to use an astringent solution for a few days to bring the mucous membrane to a healthy condition. This, briefly, is the "abortive treatment" which has given good results when instituted early enough—that is, within the first forty-eight hours.

After the second day the gonococci have burrowed into the epithelial layer and it is not such an easy matter to reach and destroy them. Irrigations are effective to some extent (if long continued and skilfully used), but injections are as a rule positively harmful—unless used merely to cleanse the urethra. The main reliance must be placed upon systemic medication and the use of soluble bougies.

Before instituting any treatment the physician should make himself thoroughly familiar with the parts affected. The existence of a tight prepuce may lead to phimosis, balanitis, etc., moreover there may be a mixed infection and unless the prepuce is withdrawn a chancre might exist on the glans unnoted. Warts, if they exist, must be promptly treated. The meatus should be studied and, if too small, a meatotomy done. The patient should be instructed that rest and cleanliness, together with the support of the organs, mean everything.

A gonorrhea bag should be ordered and the patient warned to burn all dressings and on no account to allow his towels or articles to be utilized by others. After each dressing of the penis the hands must be well washed, preferably in a mild antiseptic solution. A weak phenol solution answers. The diet must be restricted, and alcohol, spices, coffee and tobacco interdicted. The use of barley water *ad lib.* as a beverage has helped markedly. The doctor should always see to it that his patient knows what to do and how to do it; much damage has been done by careless, ignorant handling of syringes, etc.

If a syringe is to be used the patient should use it first before the physician; if bougies are to be inserted he should before leaving the office insert the first one himself. Finally he should be requested to repeat the entire technique. If this is insisted upon the results will usually be much more satisfactory.

The ordinary case of acute urethritis, in the early stage, requires this treatment. The patient urinates and the physician then irrigates the anterior urethra with either a hot boric acid solution or a solution of ichthyol—dr. one to the pint of water. The latter has given the best result. The patient is provided with a soft-rubber-nozzled glass or vulcanite syringe and is instructed to wash out the urethra with either the boric acid or ichthyol solution morning, noon and night, after first soaking the penis in very hot boric acid solution for ten minutes. If he is given the bougie treatment he is instructed to insert, after the first washing of the day, a soluble drainage bougie containing largin, zinc sulphate, hydrastin and ichthyol. This bougie is left *in situ* and the core ejected when urine is passed. At this time another bougie is carefully inserted, and so on till finally, after the night irrigation and



soaking of the penis, the last bougie is inserted at bedtime. The method of using the syringe should be well understood by the patient.

It should contain half an ounce, and be used as follows: The patient should sit on the edge of a chair or stand with feet apart. The syringe being filled (and the bladder emptied), the patient grasps the penis and, with thumb and finger of the left hand separates the lips of the meatus. With the right he inserts the nozzle of syringe, and then with thumb in ring the fingers of same hand make pressure around the nozzle while the fluid is being inserted. The left hand steadies and straightens the penis. It is a good plan for him to constrict the urethra with the left hand about two inches down while the first dram of fluid is injected. This may be retained by keeping the nozzle in place for a minute and then removing it. Another similar injection may be made to fill the penile urethra and finally, the syringe being recharged, the entire urethral canal is filled until the fluid spurts from around the nozzle at the meatus.

The injections should be done carefully and syringe and glans should be first carefully wiped with clean cotton. Between treatments the patient should cover the glans with gauze or cotton and then insert the organ into the gonorrhea bag. All cotton and gauze used must be burned. As soon as the first acute inflammatory symptoms have subsided a 1-200 protargol or 1-4000 permanganate solution may replace the ichthyol or boric acid. These may be gradually increased in strength, though, as a rule, the proportions given will, if used together with the bougies, produce excellent results.

If the posterior urethra should become infected the solutions should be carried by the surgeon well down into the bulbous portion with a small velvet-eye catheter.

Under this treatment the gonococcus gradually becomes extinct and normal tissue repair follows. It may be necessary later to use astringent solutions; a 1 per cent solution of zinc sulphocarbolate and muriate of hydrastine being perhaps the most efficacious.

Another favorite formula is: Hydrastine hydrochlorate gr. 8; zinc acetate gr. 8; glycerin dr. 4; water oz. 4-6. Mix. Inject several times daily. If no bougies are used, this solution may follow after the first week: Largin dr. 1-1 1-2, aquæ bullientis oz. 8. M. This solution should be dispensed in amber glass bottles.

**Internal Treatment:**—During the initial stages it is essential that the urine be rendered as bland and unirritating as possible. Arbutin gr. 1 may be given with gr. 2 of sodium or lithium benzoate, every four hours; and every three hours five to ten drops of santal oil (in capsule

form) may be exhibited. In the first stages calcium sulphide must be pushed rapidly for its systemic effect; gr. 1-3 being given every hour for the first twenty-four hours, then half the amount for the next two days. Gelseminine may be given in small repeated doses to relieve inflammation and pain and prevent chordee, and full doses of magnesium sulphate will be required each morning before breakfast. It is well also to tone the system with small repeated doses of strychnine (or brucine), iron and quinine. Aloin may be added if constipation exist. In the declining stages cubebin, hydrastin and eupurpurin will, if given together in moderate dosage (gr. 1-6) each, markedly improve the urethral mucosa. Camphor monobromate gr. 1, with salicin gr. 1-3, may be given at 7, 8 and 10 p. m. if chordee is troublesome, or gelseminine gr. 1-250 added to each dose.

Two somewhat new but extremely useful remedies in obstinate cases are *echinacea* and *thuja occidentalis*. Gr. 1-2 of the powdered extract of *echinacea* (or five minims of the sp. tr.) should be given with gtt. 3 of *thuja* (sp. tr.) three or four times a day. Under this medication—especially if combined with tonics and eliminants—the discharge rapidly lessens and perhaps disappears altogether.

#### POSTERIOR URETHRITIS

Urethritis, gonorrheal especially, may involve the entire urethra and the symptoms not vary much from those attending a case of anterior urethritis. That pain in the perineum, testes and groins is experienced when the deep urethra is involved, is true, but this may occur when the triangular ligament is reached. Once the bulb is infected the entire membranous and prostatic portions of the canal are involved. The desire to micturate frequently and the intense burning pain which accompanies the act, mark the majority of these cases. A peculiar feature which often marks the involvement of the deeper urethra is the sudden cessation of discharge, together with an increased desire to make water. If the two-glass test is made both portions of urine will be found opaque and infected. Or, just when an attack of anterior urethritis is fading, the patient will complain of pain in the perineum, frequency of micturition and scalding or tenesmus. This means involvement of the prostatic urethra. In some cases beyond these symptoms nothing is noticeable, but in severe infections profuse hemorrhages may occur and the patient becomes bed-fast. Fever is absent, there are few if any signs of systemic infection, though a sharp rigor may precede or follow hematuria. This is nearly always post-micturitional. Either total retention or incontinence may mark this condition. Pain-



ful erections and ejections of bloody semen also may be noted; inflammation having spread to the *caput gallinaginis*. Chordee is not present unless an anterior urethritis also exists. Prostatic abscess, stricture, or spasm of the compressor urethræ muscle may demand surgical interference. Albuminuria is often marked. Posterior urethritis may be a serious matter, or so little important that its existence may not even be suspected.

The duration is also uncertain and depends entirely upon the general health of the patient and the virulence of the infection. The whole train of symptoms may subside within four weeks or they may persist in varying degrees of severity for months. The signs of improvement are less desire to make water; greater intervals between micturition and less sense of perineal discomfort. Late in the disease it is often impossible to find the gonococcus in the discharge.

Practically the same internal treatment is indicated. Helenin, eupurpurin and hydrastin are all of service, and nuclein has given excellent results. Sounds or bougies should not as a rule be used (this does not apply to soluble medicated bougies), and no irrigations or instillations should be given till the anterior urethra has been flushed.

Warm boric acid solutions may be used twice daily, the physician in every case superintending the operation. When tenesmus lessens, instillations of silver nitrate will be called for. The earlier they are used the better. Begin with a strength of 1-10,000 and gradually increase till 1-4000 or even less is reached. Go slowly and alternate if it seem desirable with irrigations of alum or potassium permanganate. Barosmin and arbutin with hydrastin and eupurpurin are internally of great value during the declining stage of posterior urethritis. In some very severe cases after irrigating the urethra with a warm boric acid solution it is well to pass a fine catheter well back and instil a few drops of a 1-500 solution of silver nitrate. The relief is sometimes almost magical. If this is the case the injection should be repeated next day, an even stronger solution being used. Great care must be exercised. There is obtainable a small rubber tipped syringe (post-urethral) which presents a multitude of fine perforations at the distal end; this serves excellently for these instillations. Hemorrhages will cease as a rule promptly and if much distress exist on urinating (which will seldom be the case if barley water, lithium benzoate and barosmin or arbutin are given) hot irrigations of hamamelis will prove remedial. In both acute and chronic forms of gonorrhea the writer has obtained good results from the daily application to the urethra of thymol iodide, suspended in a bland, neutral oil.

## GLEET

Chronic Gonorrhea is perhaps the *bele noir* of the general practitioner. The gleet discharge may vary from the well-known morning drop (or even a morning gluing of the lips of the meatus) to a profuse mucoid outpouring which gums and stains the linen. The patient may state that he had a gonorrhea ten or five years ago, which was cured or was never quite cured as the case may be. He may however deny gonorrhea altogether, and sometimes the discharge will be found to be purely catarrhal and of non-specific origin. Prostatitis, vesiculitis, etc., may set up a gleet, and frequently there is a granulated area or eroded patch in the deep urethra which persists in weeping, being especially troublesome after sexual excess or a drinking bout.

However in many cases there is a localized inflammation of the urethra which is as distinctly gonorrheal as any other symptom of the infection. The disease is, as has been pointed out, possessed of a tendency to hang on, and as many patients discharge themselves as soon as the pain and inflammation, together with the profuse discharges of the acute attack cease, it is not to be wondered at that the infection is perpetuated indefinitely.

It is well to examine carefully every case of gleet. Prostate, seminal vesicles and every other portion of the genitalia should be gone over and abnormalities noted. The urethra may be healthy save for a patch in the anterior portion or there may be posterior urethritis with inflammation of the bulbous portion, or marked inflammation of the urethra at the penoscrotal junction.

It is as a rule safe to say that the morning drop means affection of the pendulous urethra, the discharge flowing to the meatus during the hours passed in the recumbent position. The frequent passage of urine during the day prevents the discharge from becoming visible. However there may be a marked urethritis of the bulbous portion of the urethra, and little, if any, discharge appear. The crypts of Morgagni and glands of Littre when inflamed often give rise to a viscid discharge, as also do the follicles upon the urethral floor. If these are involved examination will prove, as a rule, the *lacuna magna*—situated just within the vestibule—to be engorged and infected. From this locality issues a sticky fluid which glues the lips of the meatus each morning. Irrigations and injections *ad lib.* will fail to stop this condition, and the only remedial measure is to cleanse out the little pocket with a blunt pointed hypodermatic needle and some peroxide of hydrogen, finally touching the walls of the lacuna with silver nitrate solution,



five grains to the ounce. This should be applied with a fine probe. Some stubborn gleet has been stopped this way in less than two days. Cowper's glands occasionally, when involved, cause an intermittent discharge.

Posterior urethritis proper may follow the acute attack and drag along unrecognized for year after year. The patient complains of no pain perhaps and there is slight if any discharge. At periods however the latter presents and continues for days or weeks, to disappear again without apparent reason. In other cases though pus exist, it may not make its way through the urethra to the meatus, being held back by the compressor urethræ muscle and carried away when the bladder is emptied. Rarely such cases become, from sexual or alcoholic excess, most acute in character and pursue the typical course of an initial acute urethritis.

**Symptoms:**—If the posterior urethra is affected there may be a frequent desire to urinate, with more or less pain at beginning or end. This may be the only symptom, but on the other hand quick, sharp pains are felt, the testes and groin are tender or the patient experiences neuralgic pains and there may be slight or severe spasm of the detrusor muscles. Pollutions may occur and if there be much hyperemia of the ducts blood may be voided. Patients often complain of interference with the sexual function also—especially of a sharp pain at the moment of ejaculation. Pain over or about the pubes or in the testes and perineum is frequently present, indeed there is no limit to the variety of symptoms which may attend this condition. Naturally the small infected area in the pendulous urethra will cause little trouble but a general infection involving the prostatic urethra, prostate, seminal vesicles and ejaculatory ducts will cause not alone local symptoms but affect the patient's general health. In these more severe cases constipation, indigestion and consequent anemia exist, with the result that the victim becomes neurasthenic and depressed. At stool the fecal mass presses upon the prostate and causes the mucus present to be expelled and the appearance of this leads the patient almost invariably to the conclusion that he suffers from spermatorrhea. Nine out of twelve of the younger and middle-aged sexual debility patients will be found to suffer from chronic posterior urethritis with complications. Even when few of these abnormalities are distinctly in evidence it will be found that there is diminution of the sexual force—premature emissions, lack of sensation, etc. In many cases of acute anterior urethritis the improper use of strong astringent solutions causes the formation of a stricture. In the posterior form however the continuous inflammation in the con-

ve tissues causes first desquamation and finally a change in the character of the epithelium, the normal cylindrical variety being replaced by flat or pavement epithelium. Watery patches or polypi may form after a time tissue of a distinctly cicatricial character may be found. Strictures and erosions are not infrequent and in healing cause a growth of connective tissue which may materially alter the caliber of the canal. The strictures are most troublesome and difficult to cure.

From the above description it will be easily understood that the disease is one requiring patience and skill and frequently diversified treatment. By the use of the endoscope (or even the urethral speculum in dim light) a good idea may be obtained of the condition of the anterior urethra. The prostatic portion should not be invaded save by an expert. As sufficient knowledge of conditions can be obtained by examination of the urine, digital exploration of the prostate through the rectal wall, and careful review of the symptoms. In most cases the urethral mucosa presents either a reddish or purple tint, the discoloration being limited to one side or extending entirely around the canal for some distance. The membrane is thickened and sometimes a glairy mucus adheres to it. If the follicles are involved (follicular urethritis) red spots will be observed, slightly raised and often oozing pus. The lacuna magna offers an easily observed example. In some cases the membranes appear granular or papillomatous areas may present. Patches are rarely found within the first two inches of the canal but may exist at intervals into the bulbous portion. Even the most delicate instrumentation will cause smart hemorrhage from these areas, which consist of round cell infiltrations, hypertrophied epithelium and dilated capillaries. In the worst types the entire urethra will become red and thickened and eroded areas, ulcers, infiltrated plaques and villary growths may be scattered throughout its length.

**treatment:**—In most cases the use of antiseptic astringent irrigations is essential, and if there exist a simple catarrh of the anterior urethra with superficial involvement only this measure if persisted in may prove sufficient. Many cases are psychological and the absence of the stinging drop (after perhaps industrious stripping) would cause the patient to feel a sense of disappointment. These men require a course of tonics, mild astringent injections and some good advice. If pus is present or gonococci evident, the patient will have to be told that prolonged treatment is called for. If he present evidences of gout, syphilis, tuberculosis, rheumatism or diabetes, the proper systemic treatment has to be instituted. Faulty assimilation and elimination will have to be corrected and these measures alone will often prove half the battle.



If the urine is turbid and contains mucous threads and gonococci, and the urethra presents an inflammatory and catarrhal aspect, a daily irrigation with a 1-500 solution of alum and zinc sulphocarbolate will prove effective. If pus is evident the anterior urethra should be first filled with a 1-4 solution of hydrogen peroxide, and this should be repeated till foaming ceases. With the penis syringe, a warm boric acid solution is now used to flush the canal, and finally the anterior and posterior urethra is irrigated copiously. If it is possible to give the irrigation twice daily it will prove better. After a week or two a 1-1000 permanganate solution may be used, and if any eroded or granular patches are now discoverable they may be carefully touched with a silver solution—from 1-1000 to 1-200 according to tolerance. As the condition clears up a mild solution of hydrastis, with boroglyceride and water, may be used daily. In some very intractable but seemingly uncomplicated cases the use of thallin sulphate (15-20 per cent solution) has proved speedily curative. This solution may be alternated with either permanganate or silver nitrate. Carbenzol dr. 1 to 2, to the pint of water, is also of undoubted service. In all these instances at least two quarts of fluid should be used and the injection should be made with water as hot as is tolerable. Mercury bichloride, mercuriol, ichthargan and protargol, are used.

If for any reason it is evident that the posterior urethra is not affected the irrigations should be given through a retrojection catheter passed down to the penoscrotal junction. The passage at the same time of a perfectly sterile steel sound will often prove beneficial, but the surgeon must be governed by conditions as to the use of this instrument. It may do more harm than good, and if the patient complains of pain after the passage it is best to stop the sound, at least *pro tem*. Great care must be taken to render the sound surgically clean, and it should be passed only after the urethra has been cleansed. The alternation of sound and irrigator will prove perhaps the best method of treatment for ordinary uncomplicated cases. In some the bulbous urethra remains affected long after the rest of the tract is cured. Then instillation of a solution of silver nitrate is essential. Either a Braun syringe or a small soft catheter and convenient glass barrel syringe of a dram or less capacity is used. The end is passed until the orifice is in the bulb and the operator feels the slight resistance of the triangular ligament. Here ten to twenty drops of a 1-200 or 1-250 solution of silver nitrate are ejected. This treatment is repeated every week, and after the second day the patient may use at home either injections of some mild astringent or a mixture of thymol iodide in petrolatum. The latter is especially serviceable in these cases.

The operator will perhaps soon discover that it is not so much the material he uses for his solutions as the way in which he uses them. Some men will cure with alum and silver nitrate, while others will fail with half a score of fanciful formulæ. Gentleness, cleanliness, thoroughness and the ability to adapt the treatment to the condition, are what count. Patches, erosions and ulcers will occasionally require the passage of the endoscope and the direct application of silver nitrate solution. The writer himself has had excellent results with the following method, in cases where the bulbous urethra seemed to be seriously affected. In the morning a thallin solution (25 per cent) is injected through a catheter, and either the same evening or next morning the patient again reports and a catheter (metal), perforated with numerous holes and properly curved, bearing at the proximal end a cup for ointment and armed with a plunger, is inserted loaded with silver nitrate ointment (five parts to 75 of lanolin and simple cerate equal parts). A small quantity is expressed, the sound turned slightly and withdrawn. A cupped sound may also be used. If the latter is gradually increased in size we get stimulation and dilation at the same time. Citrine ointment, one part to simple cerate (or ungt. resinæ) eight to ten parts, will also give excellent results in some old, sluggish cases, especially when marked with hypertrophy of the prostate. If pain is occasioned a little cocaine may be rubbed up with the ointment, or, preferably, a solution of cocaine in glycerin and water to which enough adrenalin chloride has been added to make a 1-2000 solution, may be instilled into the deep urethra, and after fifteen minutes the above ointment may be used.

This method combined with irrigation of the anterior urethra with thallin or permanganate solutions, will usually prove effective even in old and severe cases. If there is much thickening of the mucosa in whole or part a solution of glycerin and iodine may be used for a few days. As a rule the endoscope will have to be used and a 3 to 9 per cent solution applied with an applicator. Lydston recommends strongly this:  $\mathcal{R}$  Iodoformi dr. 4; tr. benzoin, balsam Peru a a oz. 1. M. This is introduced through the endoscope after the urethra has been flushed with a hot iodized solution. This writer is one of the few who emphasize the absolute necessity for invading frequently the entire area of infection; especially the deep urethra. Copious antiseptic irrigations with the short meatus nozzle, together with direct treatment of special areas with silver nitrate, iodine or other antiphlogistics and alteratives are, in his opinion, the main requisites for success. In early manifestations of posterior urethritis the soluble drainage bougie containing boric acid 1-4, zinc sulphate gr. 1-8, and oil of eucalyptus gr. 1-6; the wick



carbenzol 1 drop, will prove promptly remedial and, as it is easily inserted and requires no instrumentation, is generally useful. By the use of this device the urethra is dilated, drained and medicated, the melted portion of the bougie sinking into the deep urethra to be partly absorbed.

Finally in cases which refuse to yield to any of these measures it is essential that a thorough examination of the entire urethra be made and the area affected treated directly. Shotgun methods must be avoided and the results which often follow a single well-placed application of silver or copper will prove astonishing. Silver nitrate may either be fused upon a probe or a strong solution (forty to eighty grains to the ounce) applied on a swab. A good form of applicator is a glass tube with wooden rod fitting snugly and prevented from passing through the tube by a ring at one extremity. If a little cotton bearing the solution is inserted first the rod will make it protrude and this can be touched to the ulcer or eroded spot with safety.

## STRICTURE

A stricture may be congenital or acquired—the latter predominating largely. The causes are various: Trauma (unskillful instrumentation, etc.), chemic (caustic injections), and acute or chronic inflammatory conditions. There may be merely acute engorgement or a distinct thickening of the urethral wall due to infiltration and plastic tissue formation. The first condition may occur in any acute urethritis and be followed by the latter. We may also encounter a spasmodic variety. In the latter there is no permanent obstruction and the passage of bougies or catheters invariably accentuates the condition. Frequently instrumentation is the direct cause of the contraction. The surgeon will often find the bulbous bougie firmly held at some portion of the urethra and this means that the hyperesthetic diseased area resents the presence of the foreign body.

Spasmodic stricture may be due to reflex irritation; the ingestion of such drugs as turpentine or cantharidin, cold, sexual excess, acid urine, the presence of a foreign body, alcoholism or mental strain. In extremely nervous patients the mere attempt at catheterization may cause the entire canal to become contracted. In other cases an instrument introduced cannot be withdrawn without difficulty. Gout, rheumatism and other disorders of the uric acid type may cause urethral spasm. Congestion originating in prostatic or vesical diseases may occur suddenly and set up spasmodic retention. Occasionally *urethrmus* (chronic spasmodic stricture) may cause trouble. Fistula, testicular disease or ischiorectal abscesses usually prove to be the irritative foci. The sur-

geon with bougie or sound in hand may find it difficult sometimes to decide how much of the resistance he encounters is due to spasm and how much to organic stricture, but it is safe to consider that the contraction is spasmodic, whenever the patient has hitherto passed a full-sized uninterrupted stream of urine. Experience will soon enable the operator to tell by the feel whether his bougie has passed through the unyielding ring of an organic stricture or merely overcome a spasmodic contraction of the tissues. The main points in treating this condition are to remove all possible sources of irritation; to correct constitutional disorders and lessen nervous irritability. Eliminatives are generally required; and tonics, sedatives or nervines should be exhibited as the case may demand. Instrumentation should be avoided if the urethra proves especially sensitive, but warm baths or even irrigations (using the glass nozzle at the meatus only) will often be of service. A full dose of hyoscyamine will generally give relief, but occasionally morphine or codeine will be called for. The writer some time ago discovered that a warm solution of lobelin introduced into the urethra soon causes subsidence of spasm, and allows the passage of a sound or catheter which prior to that could not possibly be introduced. In some cases of organic stricture congestion (especially of the deep urethra) is set up and upon the surgeon attempting to pass an instrument, spasm is added, the result being complete and obstinate occlusion of the canal. Anesthesia will be necessary in such cases, together with the instillation (at the point of resistance) of a solution of suprarenal extract. Then by gradual pressure the stricture can be passed. In cases of urethrmus the removal of the cause of irritation will be followed by a speedy cure. The urine in all cases should be carefully watched and hyperacidity or alkalinity prevented. Arbutin, eupurpurin and scutellarin, will all prove of service in hyperesthetic conditions of the urethral mucosa, and with these remedies triticum repens may well be combined. The local application of thymol iodide in oil has alone cured these cases.

## ORGANIC STRICTURE

The existence of a fibrous stricture having been discovered the exact location, size and consistency should be determined. The Otis bougie is perhaps the best instrument for this purpose. Begin with a 15 F. and gradually increase till the largest bougie which will pass the constriction is found. If the meatus is at all constricted, cut it. Not infrequently this step alone will relieve vesical irritability. If the stricture is of the traumatic variety it is apt to be situated at the triangular liga-



ment, as falls, kicks, blows, etc., would naturally affect this portion of the canal. As we have here to deal with cicatricial tissue the treatment is difficult and frequently perineal section will be called for. This variety may occur at any age. Thiosinamin, five grains daily for three months, is said to have caused the absorption of the cicatricial tissue.

*Congenital stricture* is rare and is usually limited to the extreme anterior portion of the canal. Gradual dilatation after a thorough meatotomy usually suffices to remedy the condition. In doing this simple operation insert a curved bistoury and incise from within outward and posteriorly. Insert a pledget of cotton and at intervals a meatus-bougie (or urethral speculum) till healing occurs.

Strictures of large caliber in the penile urethra may not even be detected, for a medium-sized sound can easily pass through them. They may serve to set up reflex contractions of the deep urethra, and the latter condition will not yield till the stricture is cured. Perhaps the most frequent site of stricture is just within the meatus, or at the fossa navicularis. The bulbo-membranous portion is perhaps next. The prostatic urethra is never involved.

In acute urethritis chordee may cause such tension that the membrane may yield and a stricture result.

There are several ways of treating urethral stricture. Gradual dilatation, electrolysis, divulsion, or internal or external urethrotomy, may be selected according to the variety of stricture or the preference of the operator. Gradual dilatation is adapted to large-caliber strictures of the deep or soft permeable strictures of the penile urethra. This method will in the hands of an expert yield excellent results where the novice would resort to the urethrotome. The patient should be given a saline cathartic and kept on a low diet for forty-eight hours prior to the first dilatation. The patient should urinate, the meatus should be washed with a creolin solution and the urethra flushed. The patient should be placed in the supine position with the thighs flexed. The Otis bougie having been used and the exact location of the stricture discovered, a sterilized curved steel sound with point just large enough to enter the stricture should be passed. Phenolized olive oil or glycerin will prove the best lubricator. Dilate slowly, never using force enough to make the thumb nail white, and remember always to use the strength of the finger and thumb only, not that of the arm. It is well to increase the size of the sound not more than three F. at each sitting, which should be at intervals of three days. If reaction is very marked and the temperature rises two or more degrees, double the time. When the stricture will admit a 32 F. the patient should return once a week, and the full size sound

may be passed. Occasionally the stricture is resilient or recurrent, and after a time the old conditions again prevail. In such cases absorption will not take place and cutting will be necessary. The Thompson or Van Buren sound is commonly used but Lydston has devised an instrument which is even more satisfactory.

The main points to be observed are asepsis, avoidance of force, patience, and the use of not more than three sounds at a sitting. Coax the sound through always and let it remain two or three minutes before withdrawing. Too much haste or rough handling will set up prostatitis, cystitis and possibly urinary fever. The injection into the urethra of a solution of lobelin—gr. 1-67 in thirty minims of hot water—will often permit the passage of a sound which otherwise could not be possibly used.

Continuous dilatation is rarely advisable. It may however be used in tight strictures where instrumentation is difficult. If a filiform bougie has been finally inserted through a tortuous or tight stricture it may be tied in place for twenty-four hours and then a larger bougie inserted. This may be continued till a No. 10 or 12 F. can be passed; at this stage gradual dilatation should be begun. In some cases a very small catheter may be used instead of a bougie, and the cystitis which so often follows the continuous presence of a bougie prevented by flushing it and the bladder with a warm boric acid solution. *Divulsion* may be performed with either a Gross, Gouley or Thompson divulsor, carefully observing asepsis. Then a large steel bougie should be passed and a catheter tied into the bladder for three days.

It should be remembered that divulsion causes trauma, while dilatation mechanically stretches and causes absorption of adventitious tissue, thus permanently increasing the caliber of the canal. The reaction which follows the use of the sound is essential, but if it is too great inflammation occurs and this aggravates the condition. The physician should never attempt to pass a sound (or catheter) into a strictured urethra until he has passed the instrument into his own bladder and has become familiar with the technique. The hemorrhage which often follows sounding is if moderate not injurious of itself, as it serves to decongest the parts; should it become excessive cold applied externally will suffice to check it. In some cases bleeding will follow urination after sounds have been passed. If in such cases the patient will insert the penis into a vessel of very warm water and urinate therein, bleeding will be avoided. Sexual intercourse should be avoided during the period of dilatation.

Cystitis may follow the use of the sounds, and if it does the bladder should be promptly irrigated with a solution of  $H_2O_2$  (one to four),



then with a warm boric acid solution, and finally four ounces of carbolic acid dr. 1 to the quart of water, may be inserted and retained for ten minutes. Internally methylene blue should be alternated with arbutin and collinsonin, and the urine kept mildly acid. Methylene blue gr. 1 may be exhibited with a little powdered nutmeg, and cubebin gr. 1-6 or cantharidin gr. 1-5000 may be added. Arbutin gr. 1, collinsonin gr. 1-3, will be useful alternants. Barley water may be given with either compound half-pint draughts, and at least four doses should be taken in twelve hours. Some one of the preparations liberating formaldehyde will also prove useful. If the urine is alkaline ammonium benzoate will be called for in full doses gr. 4-6 t. i. d.

**Internal Urethrotomy:**—The cutting of strictures has ceased to be as fashionable as it was and the average physician nowadays hesitates to use the knife. In deep strictures the Maisonneuve urethrotome is the favorite; for all others Otis' instrument. When it is decided to do an internal urethrotomy (and in nearly all annular and most resilient strictures this operation is essential), the patient is prepared and under strict asepsis the dilating urethrotome is passed. That point of the shaft at which the concealed blade will appear when being withdrawn should be about half an inch below the furthest limit of the stricture. The screw is turned until the dilating arms are stretching the stricture thoroughly and then the blade is slowly but steadily withdrawn, cutting as it comes, and the stricture is severed. The incision should be on the roof of the canal always, in the penile urethra. The dilating arms should now be separated until the desired dilatation has been secured, then they are brought together and carefully withdrawn. Otis' rule is that a penis three inches in circumference should admit a No. 30 F. sound, and with each 1-8-inch increase, one size larger. The Otis urethrotome spreads to 45 F. and as it is rare to find an organ exceeding 4½ inches (admitting a 40 F.) it is never permissible to dilate to the full extent of the instrument. Indeed, it is not advisable to go beyond 33 F. as a rule. As soon as the urethrotome is withdrawn a large bulbous bougie should be inserted and unless the canal is clear the instrument must be reinserted. Irrigation with boric acid or a mild mercury bichloride solution follows, and the patient is put to bed with either an icebag or cold water coil applied. In using the non-dilating urethrotome the guide and staff are introduced, the latter held in the median line and the blade inserted and pushed down through the stricture. The after steps are the same as when the dilating operation is done. General anesthesia is not usually necessary, a weak cocaine solution (2 per cent in a 1 per cent solution of phenol) being satisfactory. The addition of adrenalin chloride solution has been

recently recommended and it certainly aids in preventing hemorrhage.

The *electrolytic* method of treating stricture is not to be recommended and many surgeons have condemned *divulsion*, though of late years it has again become somewhat popular in the east. Urethrectomy should be attempted only by a practised genitourinary surgeon.

External urethrotomy may be done with or without a guide. There are two operations, Gouley's (with guide) Wheelhouse's (without). The former is by far the most desirable. As at least two assistants are necessary and the patient must be placed in bed with constant attention and irrigation of bladder, this operation should only be done in a hospital or where the services of a trained nurse can be secured.

**After Care and Complications:**—In all operations for stricture it is essential that the urine be rendered as nearly neutral as possible. In internal urethrotomy cases for twenty-four hours prior to the operation barley water should be given in pint draughts every four hours, with arbutin, lithium benzoate or ammonium benzoate if urine is alkaline. Eucalyptol in five-minim doses every three hours is also an excellent agent, and boric acid, salol, the formaldehyde liberating compounds, etc., may be utilized as occasion presents. The annoying chordee which often occurs may be prevented by the exhibition of gelseminine, hyoscyamine and camphor monobromate. The bromides are not as useful as gelseminine, and hyoscyamine (alternated with perhaps gr. 1-2 camphor monobromate) hourly for three doses at night. Hemorrhage will sometimes occur during the first night and can be controlled by the application of cold and a full dose of atropine, followed by ergotin gr. 1-6 every fifteen minutes for an hour. Dilatation must not be pushed too vigorously or urethral fever may set in. Should this threaten, full doses of salines with aconitine and calcium sulphide will control it.

## RETENTION OF URINE

This complication may occur either as a post-operative symptom or be due to the closure of the urethra by stricture or reflex spasm. Quite frequently the strictured patient appeals to the surgeon for relief, presenting a bladder swollen enormously. Here is where care is requisite. If relief is not afforded there may be either a rupture of the bladder wall and speedy death, or the urethra itself posterior to the stricture may give way and extravasation take place. This means danger of the most pronounced kind. The most marked depression—typhoid in character—may follow or gangrene of the parts ensue. Sometimes an abscess forms and ruptures, leaving a fistulous tract. In ordinary retention the passage of a catheter is often the only step



required, but in stricture cases (especially if there exist inflammatory conditions) the attempt to pass an instrument will result in failure.

The first step is to reduce spasm; a full dose of hyoscyamine or atropine may be given, but the writer prefers lobelin pushed at ten-minute intervals to nausea. Ten minims of a strong solution may be instilled into the urethra also. Put the patient into a hot bath, or bathe the parts with hot water. If a hot enema of saline solution is given it will help matters. If the situation is urgent (and do not allow a patient's complaints alone to make you deem it such) aspirate the bladder and draw off six to twelve ounces. Often this will relieve the spasm so markedly that a small catheter can be passed. This should be retained and depletive or other necessary treatment continued. If the catheter cannot be passed a filiform bougie may often be insinuated into the bladder and the urine will trickle away beside it. It should be tied in and later a catheter passed. Aspiration may be done, if needful, several times, using a fine needle, provided the site of puncture is sealed with iodoform collodion; and is always preferable to instrumentation if the stricture is of very small caliber and inflammation is present. In ordinary stricture if sudden retention occur, the surgeon who is familiar with the urethral conditions may feel that the passage of an instrument is impossible and proceed to aspirate. This is a mistake; often retention will cause such dilatation of the posterior portion that an instrument which could not ordinarily be passed will slip through with comparative ease. Therefore, in non-inflammatory cases the effort to pass an instrument should be made first. The local use of lobelin often aids greatly.

The writer has succeeded by introducing a small catheter, with stylet, down to the stricture and then turning on a stream of hot water. Slowly the congestion is relieved and the instrument passes through. Or dilate the urethra with warm oil. In such cases it is well to pass a tunneled dilator and stretch the stricture. Operation—gradual dilatation or urethrotomy—should be done later.

## II. DISEASES OF THE PROSTATE

### PROSTATIC NEURALGIA AND HYPERESTHESIA

These conditions are by no means unusual, and are frequently the source of infinite worry to the physician and torture to his patient. The first disorder manifests itself by frequent and excruciatingly sharp pains in the prostatic region, frequently radiating down the inside of the thighs, through the testicles and along the cord, and over

the perineal and anal region. The cause is often obscure, but usually there exists either a uric acid diathesis, or some other abnormality of the sexual organs. Congestion may accompany the condition but is not always present; a hyperesthetic condition of the prostatic urethra may also complicate matters. In many cases an examination of the urine will reveal metabolic disturbances which are fully sufficient to account for the trouble. If examination fails to show any inflammatory changes or hypertrophy and if the sound fails to reveal a hyperesthetic area in the deep urethra, a brisk purgation followed by a course of salines, with calcium carbonate, colchicine and boldine, will often prove curative. More pronounced benefit will follow if the intestinal tract is rendered therapeutically clean with the sulphocarbolates.

For the pain, temporarily, gelseminine, camphor monobromate and sodium salicylate will be indicated. Some remarkable results have followed the use of ergotin, gelseminine and barosmin, with macrotin. With the exception of gelseminine the remedies named are given in full and increasing dosage, the former not exceeding gr. 1-134 t. i. d. Rhus tox and bryonin have also proved of benefit where the rheumatic tendency was marked. Hot sitz baths are helpful and if any inflammatory condition exists a glycerinated solution of adrenalin chloride may be instilled into the deep urethra night and morning.

Injections or local treatment however are as a rule contraindicated. If there exist a marked hyperesthesia of the prostatic urethra the free exhibition of cypripedin and eupurpurin with hydrastin, and instillations of thymol iodide with petrolatum, will usually soon bring about a change for the better. The same treatment (with the addition of tonics) will apply when there is premature emission or partial impotence, with sexual unrest. In a few cases the prostatic urethra may be rendered less sensitive by the direct application of silver nitrate in solution or in ointment form.

That the condition may be due to causes far removed must not be forgotten. The dilatation of a constricted sphincter ani, the removal of hemorrhoids, the cure of an anal fissure or even the severance of a short frenum, may speedily cure prostatic neuralgia or hyperesthesia. The measures above described may—with variations to suit individual cases—be applied in those cases of *prostatic hyperemia* which are so prevalent and so hard to recognize. The man who complains of frequent emissions or too speedy ones; who has a loss of prostatic fluid at stool or a sense of fullness and tickling in the prostatic region, may on examination, present no pathologic features. Think of hyperemia then. Vesicular irritability with a desire to urinate is another symptom which



often attracts the patient's attention. The use of very hot or cold water applied through a rectal plug and return pipe often proves useful. This is especially indicated when the patient constantly feels as though an orgasm were about to take place. The sp. tr. of staphisagria two minims every three hours—with collinsonin and small doses of hyoscyamine—gives prompt relief. In all these cases constipation must be overcome and the mind turned from sexual matters.

### PROSTATORRHEA

This condition may be due to hyperemia, acute or chronic, or catarrh. In the latter case there is usually a cystitis and inflammatory enlargement. The orifices of the prostatic ducts are relaxed during congestion of the gland, whether it be due to natural conditions or disease, hence when undue hyperemia exists there may be an escape of prostatic fluid on slight provocation. At stool, after micturition (causing a milky sediment), or upon sexual excitation fluid may escape. The spermatorrhea victim usually suffers in this way and imagines that he is losing semen constantly. In this idea the quack with his lurid literature confirms him. As a matter of fact—unless the vesiculæ seminales be over-distended—semen is rarely thus excreted. However it does happen occasionally that straining at stool may cause the escape of seminal fluid into the prostatic urethra, and if the sexual debility man can discover this he uses the fact as a means of proving the danger in which the patient exists. Not a few of these charlatans however make up a paste of flour and water, which they let sour; a drop of this mixed with urine will, under the microscope, provide thousands of active "spermatozoa," and serve to scare an extra hundred dollars out of the victim's pocket. The treatment already outlined is often sufficient here—with the addition perhaps of tonics. The arsenates of iron, quinine and strychnine, with hydrastin and eupurpurin, will prove efficient. Staphisagria is remarkably useful also. Mild mercurials and salines must be given as needed and cold sponging will be useful.

Instrumentation is rarely needed but in some few cases the cold steel sound helps. Cleanliness, dilatation of the rectum and a restricted diet will do a good deal. Suggestion should be used also to the fullest extent. The patient must be made to realize that he is not losing a vital fluid and is not impotent. This done and a normal condition of the bowel with regulated circulation and thorough elimination once secured, the rest should be easy. Lecithin should not be forgotten in those cases which present marked exhaustion or nervous debility.

Finally, in intractable chronic cases, astringent solutions may be used. A properly prepared soluble bougie is also suggested. The most useful astringent is perhaps boroglyceride dr. 1, carbenzol (aqueous distillate) drs. 2, glycerin oz. 1, water, ozs. 6. M. Massage of the prostate through the rectal wall with the finger-tip gives good results, especially if a dram of euarol is first thrown into the rectal ampulla. One massage per week is usually enough, but the doctor will regulate the seances by the benefit derived. Prior to and after massage give a hot irrigation of the rectum. The free exhibition of tonics—quinine, iron and arsenic—with thuja and staphisagria will always give good results.

The condition must be differentiated from the hypertrophy which is so often met with in men after forty-five. This condition may arise from a long continued inflammation but in the end distinct fibrous changes occur which do not yield to any medicinal or mild local measures.

## ACUTE PROSTATITIS

Of all the painful and depressing maladies affecting the genito-urinary organs this is probably the worst. Infection may occur from the urethra; traumatism may be the exciting cause; sexual excesses, instrumentation or even exposure may be responsible. In certain general systemic infections the prostate may suffer; thus, acute prostatitis may follow an attack of mumps. The condition has accompanied smallpox and scarlet fever. In most cases direct infection takes place. Deep injections, the passage of sounds, etc., are often to blame. The varieties of the disease are not of great clinical importance. Acute suppurative prostatitis may be diffuse or circumscribed. Miliary abscess may exist or periprostatic abscess; in the latter case the prostate itself may not be the seat of suppuration. Quite extensive destruction of tissue may occur, in this form the pus being pocketed about the rectum and possibly finding exit in or at the bowel margin. In hypertrophy the formation of an abscess is not uncommon and is probably due to passage of instruments. That death may follow prostatic suppuration should be remembered, and the possibility of urinary or ano-rectal fistulæ following spontaneous evacuation of an abscess should cause the physician to use the knife as soon as pus is located. Acute cystitis or Cowperitis may be mistaken for acute prostatitis but as a rule the former condition can be speedily eliminated by examination of the urine and palpation of the prostate itself. In Cowperitis the prostate is not enlarged and the affected gland presents a round swelling to the exploring finger. Both conditions may exist simultaneously.



The first symptoms of the disorder may be vesical irritation or urinary retention. Marked tenesmus with dysuria are not uncommon and there may be difficulty and distress in defecation. Rarely the first thing to attract attention is the inability to urinate. Far more frequently the patient feels a heavy pain in the perineum and complains of headache, malaise and alternate chill and flushing. Gradually the whole parts feel as though carrying a weight, and lancinating pains are constant. The call to urinate is frequent but often the act cannot be accomplished, or if it finally is, pus or even blood may be voided before or with the urine. The severity of the inflammation, the extent of tissue affected, and the involvement or escape of the prostatic urethra, serve to govern the symptoms.

Acute suppurative prostatitis may not be recognized till pus is discharged into the urethra, and this having occurred healing may steadily progress and a cure follow. However this may not be the case; the cavity may remain as a pus producing sac, and bacteria may traverse the sinus from the urethra and cause prolonged suppuration. Acute attacks of urethritis and cystitis may complicate matters. Acute prostatitis being suspected, the probability of abscess formation should be considered and a sharp watch kept for any sign of pus formation. If the abscess points towards the rectum it is easily recognized and a sensitive finger can often detect the condition quite early through the induration of the perineum. The preëxistence of a urethritis will make diagnosis more difficult, though careful examination will generally enable the physician to make a diagnosis. The fact that in every case of urethral disease acute prostatitis (suppurative or simple inflammatory) is a possible complication must not be lost sight of. Many cases are due to the bungling attempts of the individual afflicted with gonorrhea to treat himself

**Treatment:**—Give a brisk purgative. Nothing proves so effective as gr. 1 of blue mass and soda, repeated hourly till five grains are taken at night, and next morning early a saline should be exhibited. The treatment may be repeated next night. Aconitine, veratrine or gelseminine should be given in small doses every two hours, the first-named being perhaps the most generally applicable. Hamamelin hydrastin and ergotin should also be given in full doses. The depleting suppository, (magnesium sulphate with glycerin) may be used per rectum, one being inserted night and morning—or carbenzol suppositories may be used. The idea is to deplete the parts. If free watery stools can be secured without setting up irritation we have done much toward putting an end to the condition. If after each stool a copious hot enema can be given

much benefit will follow. The cases which are able to go about will often require little further treatment unless pus formation is feared, when calcium sulphide should be pushed, gr. 1-6 being exhibited each hour. The diet should be light and productive of little waste. A hot sitz-bath may be ordered at night.

The more severe cases will have to be put to bed and more pronounced measures taken. Gelseminine will often here prove better than aconitine, and ice may be used locally. The writer has found however that this does not give as good results as hot applications, hot enemas and baths. The urethra should not be invaded unless catheterization becomes absolutely necessary. Too frequent examinations per rectum even are not advisable. The progress of the case may be gauged by the symptoms. Frequently a cantharidal blister to the perineum (shaved thoroughly first) will end the process; if this is objected to iodine may be painted over the same area or leeches applied. Anodynes if necessary should be given *per os*, codeine being perhaps the best drug we can select, though hyoscyamine is useful. Tonics should be given in nearly all cases, nuclein and brucine being perhaps the most desirable. Diuretics are not indicated especially, though the urine should be rendered bland and aseptic with arbutin or formin. Barley water is the safest beverage, together with a solution of magnesia sulphate flavored with lemon juice and sweetened. Both may be taken freely.

Should retention of urine occur the smallest, softest catheter that can be passed should be used or aspiration may be preferable, especially is this the case where the urethra is known to be infected and retention appears to be due to temporary spasm or engorgement. Under this treatment the case is apt to improve in a week—or less time—and with care recovery takes place. Relapses are however frequent and reinfection may occur if the patient fails to follow up treatment.

If suppuration has commenced, or takes place despite treatment, echinacea and calcium sulphide must be given constantly, and nuclein should be pushed hypodermatically; gr. 1 echinacea, or ten drops of the specific tincture every two hours, and gr. 1-3 calcium sulphide, will suffice in most cases. After forty-eight hours the dose may be reduced one-half. The treatment otherwise will have to depend upon the general conditions; fever must be controlled if excessive (it is seldom pronounced if the above measures are taken); the bowels must be kept freely open and the urine rendered faintly acid. Conservatism is desirable to a certain point but the moment pus can be distinguished in a definite amount an incision must be made and drainage secured. The incision should be in the median line—along the raphe—of the perineum; this



location should be chosen even when the cavity can be located per rectum. The incision should be free and if necessary to cut deep along the urethra the underlying tissues should be divided with forceps and a director carried into the abscess cavity. In rare cases (generally old neglected ones) the abscess points near the anus, then the incision can be made over the area where the covering is thinnest.

Sometimes several separate abscesses exist. Each one should be opened; wherever possible the cavities should be irrigated first with peroxide of hydrogen, then with aqua cinnamomi, or phenol solution. Gauze drainage should be provided in all extensive abscesses. The possibility of urinary infiltration must be considered but it rarely occurs if proper care is taken. If an abscess ruptures into the bowel or if it is evacuated per rectum great care is necessary to prevent infection and fistula. Irrigation will have to be frequent and it is desirable to put the patient to bed and insert a good-sized tube wound with iodoform gauze to secure drainage. The sphincter should be thoroughly dilated. The use of poisonous antiseptics is to be avoided here. Peroxide of hydrogen, creolin solutions, iodine, carbenzol and boric acid are to be preferred. Colloidal silver (ung't Crede) may be rubbed into the perineum or applied per rectum. Systemic antiseptics and reconstructants will be required for weeks. Urinary fistulas may result as a consequence of the abscess rupturing into the urethra or through the perineum.

In all cases the prolonged use of vesical irrigations will be called for. The patient should not be allowed to pass from under observation for months, otherwise chronic suppurative conditions are likely.

### III. DISEASES OF THE BLADDER

#### ACUTE CYSTITIS

Acute cystitis is an acute inflammation of the bladder mucosa. Infection is nearly always to be suspected. The rheumatic, gouty, alcoholic or strumous individual is prone to contract cystitis—especially if exposed to cold and wet. Urethral disease and rectal affections may cause it; bacteria, constantly present, which are harmless under ordinary conditions may when resistance is lessened set up inflammatory processes. That gonorrhea—often unrecognized—is in the great majority of cases the primal cause of cystitis is unquestioned, and it is also a fact that a large percentage of cases are but extensions of infection from the deep urethra. The passage of unsterilized instruments may easily set up cystitis of virulent character without infecting the urethra proper; especially is this

the case with catheters which retain bacteria in the eyelet. Injections may be forced into the bladder and by their irritative or caustic action set up cystitis. The gonococcus rarely invades the bladder, and even when a specific urethritis exists, coincident cystitis is due to invasion by streptococci or other bacteria. Abnormal conditions of the urine may cause destruction of the epithelium lining the bladder, thus permitting access to germs and offering conditions favorable to their propagation, but that the urine itself sets up the condition is to be doubted. Whatever the immediate cause it is safe to say that congestion first of all existed. This applies even when a healthy bladder is infected by a catheter; some abrasion with the consequent congestion being necessary for bacterial propagation. In this connection the trauma caused by the presence of a calculus is to be considered. The exhibition of highly irritant drugs—turpentine, cantharides, etc., may cause primary inflammation. Acute cystitis is quite likely to assume the chronic form (so called "catarrh of the bladder").

The symptoms of cystitis are easily recognized. There is constant desire to urinate, with tenesmus, marked tenderness upon pressure (perineal, rectal or vaginal), pain is experienced behind the pubes, down the inside of the thighs, in the sacral region, and sharp sticking pains may be experienced in the glans penis. The urine is alkaline, loaded with triple and amorphous phosphates, turbid, contains mucous shreds, pus and later blood. The sp. gr. ranges from 1005 to 1015. As a rule fever exists early, the temperature rising to 101-102 F. or higher. Retention of urine may occur.

**Treatment:**—Rest is essential. The bowel must be kept clean and empty with mild mercurials and salines. Aconitine or gelseminine must be pushed early, and here again gelseminine will be found to surpass aconitine. Hyoscyamine is usually given in alternation with one of the above, and its anodyne action frequently proves sufficient; but in some cases codeine will be called for. The benzoates in full-sized doses, with arbutin and hydrastin, will prove the best diuretics. The diet should be light. Hot baths and hot applications over the perineum and bladder are of service. The main point in the treatment is to maintain free elimination of a normally acid fluid. Under the above treatment the symptoms usually subside, and then cubebin, chimaphilin or eupurpurin may be given with a view to restoring normal tone to the affected mucosa. If pus is very abundant calcium sulphide will be indicated and in this case it must be pushed to saturation of the patient. In gonorrheal cases this drug is especially valuable. The physician will occasionally meet with cases in which vesical pain is so intense that the ordinary exhibi-



tion of anodynes proves insufficient. Great relief will be afforded if after irrigation two or three **drams** of a 1 per cent solution of cocaine be thrown into the bladder and retained as long as possible. In irrigating and passing the catheter for retention the most scrupulous care must be observed as to asepsis.

Often a debilitated condition exists in these cases, and here the arsenates of iron, quinine and strychnine—with or without nuclein—will be indicated.

### CHRONIC CYSTITIS

This condition may succeed an acute cystitis, of any causation, the latter gradually assuming a chronic type, or it may commence so gradually as to be unrecognized until well established. The presence of some irritant (foreign body, calculus, etc.) sacculation, with retention of urine, tumors of the bladder-wall or neighboring parts, exerting pressure—prostatic diseases or urinary abnormalities, any one or more of these combined may cause chronic cystitis. In rare cases a rectovesical fistula or sinus from pelvic abscess may cause infection of the bladder. Pus may pass through the normal bladder without affecting it, as is evident from the fact that pyelitis may exist without cystitis, but if congestion of the bladder mucosa takes place, bacteria cystitis results generally. Tubercle bacilli may invade the bladder and the *b. coli* commune is frequently found in cystitis. The usual classification is catarrhal and suppurative, ammoniacal and acid. It is said that the tubercle bacilli and *b. coli* alone are present in the acid form. In the alkaline bacteria exist, which decompose the urine. Suppuration with acid urine is rare and never due to instrumental infection.

The symptoms resemble those of the acute disease but are less pronounced. The bladder refuses to retain even a small quantity of urine, and the patient constantly micturates and is as constantly in distress. The pain may be pelvic or sacral, or situated just behind the pubic bone, radiating therefrom—just prior to, during and immediately after the act of urination—down the interior of the thighs, through the scrotum and penis. The peculiar backache which attends some cases of cystitis is diagnostic. It is constant but varies in intensity, becoming more intense upon exertion, when the bladder contains much urine, and prior to defecation. Rest, and an empty bladder and bowel, will cause the pain to practically disappear for the time. The urine is usually highly ammoniacal, though it may be acid, becoming, however, alkaline on standing. It is also fetid. Mucopus, mucus shreds and sometimes blood are present, together with triple and amorphous phosphates in large

amount. If calculi are present blood in the urine is frequent and the passage of concretions not uncommon. However one or more large calculi may be present without causing hematuria or any distinct symptoms not usually present in cystitis. Instrumentation alone can detect their presence. An important constitutional symptom of chronic cystitis may be eczema; quite a large number of patients sooner or later present this and other diseases of the skin, which are of course due to imperfect renal elimination. This leads to the conclusion that chronic cystitis affects to a greater or less degree renal activity. The absorption of the products of urinary decomposition is also the cause of systemic toxemia—of which the so-called urinary fever is a type. The entire train of disorders due to renal inadequacy (even to uremia) may have their origin in cystitis. The generally accepted idea is that the cystitis is always secondary to renal disease, but investigation will prove that quite frequently the cystitis existed primarily. This is an important difference, as it becomes in all such cases necessary to relieve the bladder conditions before we can hope to secure normal renal activity, with the accompanying improvement of the constitutional symptoms. A cystitis due to renal disease of a systemic toxemia may be ameliorated without markedly improving the patient's health, but if we can cure a chronic cystitis causing renal disorder the *fons et origo* of the trouble is removed and recovery rapidly follows, the whole train of symptoms rapidly passing away.

It might also be well to caution the young physician not to forget that the nervous irritability and general mental disturbance may be due to a very great extent to the constant pain and wakefulness more than to any direct effect of the malady itself. The man who has to arise and empty his bladder several times each night is not apt to feel extremely brilliant in the day time, especially if he suffers constant pain. This pain and sleeplessness become then a special source of concern to the physician.

**Treatment:**—The most careful attention to the general hygiene is necessary. The diet must be limited and bland. Milk indeed should form the staple article of food. The bowels and skin should be kept active by mild measures—baths, enemas, etc., and the bladder itself must be kept as nearly clean and germ-free as is possible. Antiseptic diuretics, demulcent drinks and the proper irrigations, frequently repeated under aseptic conditions, will work a great improvement in a few weeks even if they do not cure.

The choice of medicines in each case will depend more or less upon the urinary conditions. In early cases where the urine is highly acid, alkaline diuretics will be beneficial. Calcium carbonate and potassium



acetate may be given in such cases, but the most useful of all the alkalis will prove to be a combination of ammonium benzoate, arbutin and cubebin. The benzoate should be given in dosage sufficient to produce speedy effect—gr. 2-5 every four hours. Every two hours arbutin gr. 1, cubebin gr. 1-6, should be exhibited with a glass of thin barley water. Or if it is preferred the benzoate may be taken with the latter. Guaiacol and its derivatives will give excellent results, and eucalyptol is without question one of the best of the antiseptics. Eucalyptol and salol may be given together after the acidity of the urine has been somewhat overcome, alternated with either arbutin, asparagin, barosmin, chimaphilin or eupurpurin, and hydrastin alone or in various combinations. Calcium carbonate with lithium gives relief in these cases, and may well be exhibited in alternation with eucalyptol and salol, each remedy being exhibited for twenty-four hours.

The urine being fairly normal in character and amount, those drugs which derange the stomach—eucalyptol, guaiacol, salol, etc.—may be discontinued, and asepsis maintained with some formaldehyde-liberating agent (formin compound), or methylene blue. Neither of these should be given until the urine is fairly free from mucus, or while intense acidity prevails.

By far the greater number of cases however present alkalinity of urine, and many of them suffer from retention to a greater or less extent. This residual urine, decomposed and bacteria breeding, must be flushed out before it can do damage. Here in many cases lies the secret of cure. Internally these cases require formin compound and benzoic acid in small repeated doses. Strychnine and hydrastin will have to be given for their tonic influence—systemic and local.

*Triticum repens* with barosmin and eupurpurin may be given in alternation, or as the main remedial agents, once the urine clears up and remains clear for some time. Some one or other of the more potent antiseptics must be given throughout however, even if in small dosage. To allay pain and assure rest hyoscyamine, codeine and cannabin will have to be depended upon, though a thorough regulation of urinary and bladder conditions will do more than any anodynes. However, hyoscyamine in small repeated dosage may be relied upon in the early stages of a case to give freedom from pain and sleep.

The local treatment is after all the most important matter. Do not accept a case of chronic cystitis unless you can attend to it yourself or know that your orders will be carried out. At first the irrigations must be very carefully given. Creolin is also an admirable agent but causes burning when used early, or in very inflamed or ulcerated bladders if in

efficient strength. Later it is perhaps our best application. Carbenzol may be used from the first, the only objection to it is that it stains linen. One dram to the pint of water is the usual strength. After irrigation a little 1 per cent solution of cocaine may be thrown into the bladder and left there for some time. However this is inadvisable. The writer has found olive or linseed oil bearing a very small proportion of menthol give immediate relief. This may be thrown into the bladder after irrigation and left there to pass with the urine. Glycerin is not advisable alone. The use of solutions of bicarbonate of soda will suggest itself to the physician who has to deal with extreme acidity of urine. Boric acid may be used but is not as effective in chronic cystitis as in the acute form.

In some cases irrigation will seem to make matters worse. When this is the case use smaller quantities of another solution. However, the natural smarting which follows the intravesical use of many antiseptics must be considered. In tubercular cystitis nothing will prove more efficient than thymol iodide in petrolatum. Two drams carefully warmed may be thrown into an empty bladder.

Distinct gonorrheal cystitis will call for the silver salts—argyrol, argonin, largin, ichthargon or protargol. Largin and ichthargon have given the best results. Silver nitrate may be used with care.

**Cystitis in Women:**—The same treatment applies. The urethra may be dilated and the bladder thoroughly flushed with the chosen solution. In distinctly infective cases of rebellious type the bladder mucosa may be swabbed with silver nitrate solution through the endoscope, dr. 1-2 to the ounce of water may be used. Any uterine displacement should be corrected and vaginitis if it exists promptly treated. Hysterical females may require dilation of anal sphincter and urethra, and a course of tonics. Cyprisedin, scutellarin and quinine valerianate, with the "triple arsenates"—quinine, iron and strychnine—will prove efficacious. Cases which refuse to improve may be curetted with a blunt curet.

## TUBERCULOSIS OF THE BLADDER

Where a tubercular taint is suspected and symptoms of cystitis present, have the urine examined for the tubercle bacilli. The centrifuge will often reveal the presence of the germ at quite an early stage. Unfortunately the general symptoms are so similar to an ordinary cystitis that it is sometimes impossible to diagnose correctly. The cystoscope will aid greatly. Emaciation of the patient and passage of purulent or a bloody urine with no history of other possible source of infection should cause suspicion. Prompt systemic treatment is called for, iodoform, helenin and calcium sulphide being most useful. The arsenates with



nuclein must be pushed freely. Guaiacol internally and locally (in solution) will give decided results and euarol may be alternated (locally) with this drug with advantage. Guyon uses pure guaiacol by instillation. This treatment has been quite enthusiastically commended by competent clinicians. The possibility of extensive ulceration is always to be dreaded, and if the involvement is extensive cure is impossible. A limited area—revealed by the cystoscope—may be curetted.

When uric acid concretions exist, calcium carbonate compound (calcium carb., lithium and colchicine) should be given; ten grains every four hours, with plenty of water. The diet should be restricted.

### PYELITIS-PYELONEPHRITIS

The malady known as Pyelitis or inflammation of the renal pelvis may be due to the presence of a calculus; to nephritis, ureteritis (ascending cystitis), the infectious diseases (most common cause), exposure to cold, cancer or tuberculosis. Certain irritating drugs may also set up the condition. Pyonephrosis or pyelonephritis are really more severe forms of pyelitis, the latter term expressing the same conditions when suppurative and the former an accumulation of pus due to blocking of the ureter. In simple catarrhal cases there is pain over the kidneys (often the affection is bilateral), and the urine excreted is acid, turbid and filled with mucus, mucopus and epithelial cells. The condition may become chronic. Quite frequently the origin of a pyelitis is lost, attention having been centered upon the original disease. Usually the patient complains of fever and chills, exacerbations of pain in the small of the back, and nausea which may end in vomiting. Chills are often followed by profuse perspiration which may have a distinct urinary odor. In some cases the quantity of urine is decreased markedly and reflex anuria is not uncommon. Palpation reveals nothing, the kidney rarely being enlarged unless pyonephrosis exists.

In chronic cases the general health suffers but local symptoms are less pronounced and fever if present is intermittent. The urine may be increased in amount and on examination proves acid or neutral, containing albumin, pus, epithelium and hyaline casts; granular casts are extremely rare. In severe suppurative cases all these symptoms are accentuated, and if pyonephrosis exists a distinct tumor can be felt on palpation over the kidney. If the condition persists the whole kidney may be practically riddled with abscesses. The pelvis may rupture and set up perinephritic abscess, or the pus become inspissated and the kidney contract. In exceptional cases the kidney may become adherent to some other organ and rupture into it. One of the main diag-

## NEPHROPTOSIS

nostic points in pyonephrosis is the tumor in the groin; another intermittent pyuria, the blocking of ureter being as a rule incomplete. In cystitis pyuria if present at all is constant.

Quite frequently when the pyuria is marked the tumor becomes small or indistinguishable; when the urine is free from pus the tumor becomes evident. The presence of such a fluctuating tumor, with pyuria and septic symptoms, means pyonephrosis.

Pyelonephritis, as already pointed out, is really a more severe form of pyelitis, the infection here extending into the uriniferous tubules and parenchyma of the kidneys, converting the gland into a huge pus sac or causing multiple abscesses. In either cases operative interference may be demanded. Aspiration may be done in pyonephrosis but nephrotomy with free drainage is preferable. If one kidney alone is implicated operation should be done early as infection of the other kidney may occur.

The treatment in pyelitis and pyelonephritis consists in the exhibition of urinary and systemic antiseptics and tonics. Elimination via the skin and bowel must be stimulated and the kidneys relieved of as much work as possible. Salines are essential and such drugs as are given should be exhibited with abundance of water. Arbutin should be pushed up to 20 grains a day and maintained for months. The condition responsible for the pyelitis will often greatly modify the treatment. Cystitis must receive attention; nephritis will require its specific medication and systemic infections receive due attention. Fortunately none of these diseases prevents us from using effective medicaments. The system may be kept free from waste by calomel and saline. Calcium sulphide may be pushed till saturation, and glandular activity maintained by boldine.

The circulation should be rendered as nearly normal as possible; small repeated doses of cactin and strychnine serving us well as vital incitants and cardiac tonics. Nuclein is invariably of service, not alone in the local diseases but as a general reconstructant. The main thing then is to support the system; relieve the kidneys as much as possible, and aim to bring about as rapidly as possible destruction of bacteria and reparative processes.

## IV. DISEASE OF THE KIDNEYS

### NEPHROPTOSIS

**Movable or Floating Kidney.** This is a condition usually due to a relaxation of the perinephritic tissues. The organ may be found in almost any portion of the abdominal cavity. The right side is most



often affected and women suffer more frequently than men. Tight lacing must be looked upon as the main cause in many cases. Women who have frequent pregnancies and are debilitated are very prone to movable kidney.

Rarely pressure on the biliary passages may cause colic and jaundice. Other symptoms sometimes present are constipation, edema, palpitation, flatulence, dysmenorrhea, dysuria and abortion. Pregnancy brings relief. Dietl's crises are sudden and severe attacks of colic, chills, fever, vertigo, vomiting and collapse, at the menstrual epochs or periodic. Hydronephrosis follows if the attack is due to obstruction of the ureter by twisting, etc. The urine is thick, scanty, with uric acid or oxalates. Pyonephrosis and gangrene sometimes occur.

**Symptoms:**—These are often vague. There is a sense of discomfort with a feeling of "tugging" or drawing in the loins and occasionally the gastric disturbance is quite serious. Constant nausea or expulsive vomiting may be noted. At times the pedicle becomes twisted or pressed upon and then attacks closely simulating renal colic develop. Hysteria is apt to be a symptom. The kidney may often be found; upon pressure a sick faint feeling is complained of, akin to that experienced when the testicle is compressed. In some stout or muscular patients however it is impossible to discover the traveling gland, but deep percussion over the kidney area upon one side will develop a lack of resistance. The discovery of a reniform tender tumor anywhere within the abdomen, together with the presence of the symptoms described and absence of cachexia, will serve as sufficient grounds for a diagnosis of movable kidney.

**Treatment:**—In light cases a course of tonics (berberine, 1 to 5 grains a day for months contracts the relaxed connective) together with rest and nutritious food will serve to control the condition. Seek to increase abdominal fat. A broad abdominal binder with a pad sewed in to make snug pressure *under* the kidney may be worn. In old and pronounced cases nephrorrhaphy should be done. This operation is safe, and if well done effective. Watson says over 90 per cent are relieved by supporting corsets.

## RENAL HYPEREMIA

There are two varieties of hyperemia (congestion) of the kidneys; active and passive. The former may be due to exposure, pregnancy, the exhibition of certain drugs such as cantharides, turpentine, squill, potassium chlorate, phenol, eucalyptus, copaiba, etc., chill when heated, or to the presence of any of the acute fevers. Ether is also blamed. Occasionally the passage of a catheter may set up the condition.

The symptoms are pain, slight fever, a sense of heat or fullness in the loins, with, in some cases, marked reduction in the amount of urine passed; the latter may contain blood, albumin, and a few hyaline casts. Edema is not present.

**Treatment:**—Salines, the hot pack or hot compresses over the kidneys with small doses of aconitine or hyoscyamine prove useful. The use of pichi has been strongly recommended and may be given with a good preparation of triticum repens. Arbutin, 1 to 5 grains a day, is very effective. Milk or milk and barley-water should be given ad lib. and the patient kept in bed. Hot saline enemas are of marked benefit. A full dose of pilocarpine (gr. 1-6) gives prompt relief.

#### PASSIVE HYPEREMIA

This condition of the kidneys generally accompanies cardiac, hepatic or other chronic disease; it is frequently present in lung disorders when the circulation is impeded. Tumors which exert pressure upon the renal veins, collections of ascitic fluid or even the gravid uterus, may set up passive congestion. In rare instances thrombotic obstruction of the vena cava or large renal veins will cause intense congestion.

The symptoms are not hard to recognize. The primary disease causing the stasis must always be considered, as cyanosis edema, and dyspnea could not possibly be due to renal hyperemia alone, and we generally find one or more of them present. As a rule the urine is dark, scanty and of high sp. gr., 1030 to 1040 being not at all unusual. Albumin in small quantity is present and sometimes a few hyaline casts and red blood cells are noticeable. Pain over the kidneys is apt to be complained of, the patient describing it as a pressing, burning or pricking; if there is any displacement of the organ the pain may be distant from the renal site.

**Treatment:**—The most important thing is to relieve the primary condition. A course of blue mass and soda, or calomel with iridin or boldine, will if followed by salines give prompt relief. The small divided dose is here particularly useful: gr. 1 of blue mass and soda, or gr. 1-6 of calomel with an equal quantity of iridin and boldine, being exhibited hourly for four to six doses; three hours after the last dose a saline is given, and then every three hours scillitin, digitalin, or possibly minute doses of gelseminine may be given, with arbutin or chimaphilin. The latter is particularly valuable and if alternated with the infusion of juniper may be regarded as one of the most promptly acting remedies. Of late adrenalin has been recommended. High enemas are indicated; three pints to two quarts of normal saline solution being thrown well up into the bowel and retained as long as may be.



## UREMIA

This dangerous condition is often the first sign recognized of nephritis, patients who have been treated for various vague disorders suddenly presenting unmistakable signs of profound toxemia. Even with our present understanding of the body chemistry we are not able to state positively the nature of the toxins which produce the symptoms found in uremia, but there is no question that non-activity of the kidneys causes their presence in the blood. An examination of the urine will reveal decreased urea—possibly a total absence—and the specific gravity will be high; possibly a large amount of albumin and hyaline, blood and epithelial casts will be found; indeed the urine of the uremic patient will usually present all the pathologic features of nephritis. The profound coma and convulsions which occasionally come on abruptly are supposedly due to edema of the brain, but a better understanding of the metabolic processes will probably reveal the presence of a virulent toxin produced only under certain waste-laden conditions of the blood.

Elimination, prompt and thorough in character, alone serves to save patients so affected. Uremia is apt to develop in any form of nephritis, and should be carefully guarded against. Headache, giddiness, asthma, hiccoughing, nausea or vomiting, dyspnea and a dry skin, with slow pulse of high tension, must be looked upon with suspicion. In some cases some one or several of these minor symptoms will attract the patient's and doctor's attention, and if in addition there is scanty or almost total suppression of urine with urinous odor of the breath, it is certain that uremic poisoning is present. Sudden mania, convulsions, coma, deafness or blindness, or partial paralysis, may be the first thing to demand medical attention, and it is then necessary by examination of the urine and the past history, to recognize uremia. *Uremic coma* is invariably accompanied by a urinous odor of the breath, the pupils are contracted evenly, temperature may be either above or below the normal but is usually 103 F., the aortic second sound is accentuated, and the urine (which has been scanty) invariably contains albumin. Urea is scanty or absent. The face is pale, often cyanotic, sometimes edematous and not infrequently a general dropsical condition of the body reveals the nephritic origin of the stupor. There is no history of epilepsy or other probable cause for coma. The patient may have complained of headache and delirium may have preceded unconsciousness. Cirrhotic coma will usually be accompanied by jaundice, the patient will be emaciated, and epistaxis, hematemesis or bloody stools will have been noted. Traumatic coma can hardly be mistaken, and apoplexy

presents an entirely different picture, delirium or convulsions being absent and the urine presenting no deviation from normal. In apoplexy the tongue deviates and paralysis is evident. The malady may develop in chronic form. The convulsions may simulate *petit mal*, or *grand mal*.

**Treatment:**—In the more serious forms of uremia elimination must be secured promptly, life depending upon the rapidity with which we work. The urine should be promptly drawn with a clean catheter and the bladder washed out with warm boric acid solution, a small quantity being left in the viscus. A plentiful and warm high enema of normal saline solution will be given, and after this has been rejected two quarts more will be thrown into the colon and retained by pressure upon the anus. A wet-pack should be prepared and into this the patient should be placed. Pilocarpine is given hypodermatically in full dosage, and elaterin pushed in frequent fractional doses; menthol should be added and hyoscyamine, gr. 1-250. Strophanthin, sparteine, scillitin or digitalin will prove useful if vascular tension is low, and the selected drug may be given at frequent intervals to effect. If arterial tension is high a few doses of glonoin, gr. 1-250, will be speedily helpful but veratrine should be pushed rapidly to full effect. Salines may be given at hourly intervals. The patient should receive these medicines in the pack, being kept therein for at least two hours; by this time the bowel and kidneys will usually be acting freely and profuse perspiration will be produced. If unconsciousness persists dry cups may be applied or venesection practiced. In extreme cases it is well to open a vein and allow twelve to eighteen ounces of blood to escape, and then inject into the opened vein (median basilic) double that amount of sterile normal saline solution. If however the bladder and bowel are speedily washed out and the hot wet pack used, the medication suggested will suffice in nearly every case. Very effective is a small enema of saturated salt solution. The exosmosis into the bowel from the blood removes the lethal toxin surplus. The doctor or nurse should remain with the patient till safety is assured.

**To prepare the wet pack:** Cover a couch or cot with a quilt or rubber sheet. On this lay a thick dry blanket; wring a thick sheet or blanket out of hot water and carry it rolled to the couch; spread it and have the patient, perfectly nude, promptly placed in it and wrap him from toes to chin in its folds; over this wrap the dry blanket and then the quilt. Give medicines with a few swallows of saline solution and bathe the face with cool water, keeping a wet piece of linen on the head. When consciousness returns give veratrine or sparteine, according to tension.



A saline draught each morning will be needed also. Other treatment will be instituted as symptoms may demand.

### ALBUMINURIA

Even in the healthy individual minute quantities of albumin, serum and sugar may be present in the urine, but it requires delicate chemical tests to discover them. Albumin is occasionally found in the urine of adults after great exertion, and children apparently in good health may also excrete albuminous urine occasionally. "Cyclic Albuminuria" is a term used to express this condition. The cause of the albuminuria is not well understood but it appears and disappears with considerable regularity. It is a strange fact that the urine passed by these patients in the latter part of the day is usually free from albumin. This rule does not apply however to the urine of children approaching puberty, who may show a marked albuminuria for a time without otherwise evidencing departure from health.

Pathologic albuminuria occurs in all forms of nephritis, in renal hyperemia—especially when secondary to diseases of heart, liver or lungs—in anemia, purpura, leukemia and other serious blood disorders; in pregnancy; febrile diseases; apoplexy, tetanus and epilepsy. It has been satisfactorily proven that any damage to the renal epithelium will cause albuminuria, and Edebohls cured a long-standing case by fixing a dislocated kidney with torsion of the preter. Albumin may also be present in the urine when circulatory disturbances exist. The albumin found in the urine when *pus* is present cannot be looked upon as a true renal albuminuria. Exposure to cold may cause inflammation of the kidneys with accompanying destruction of epithelium and albuminuria, and quite often we can gauge the extent of the epithelial degeneration by the amount of albumin present in the urine. In all the conditions mentioned the albumin is derived from the blood (serum albumin); in measles globulin alone is found, and we do not yet understand the reason for its presence.

It will be evident from the above that it is irrational to attempt to treat albuminuria; we must discover the reason for its presence and set ourselves to relieve the underlying pathologic condition. Constant and marked albuminuria without well-defined evidences of other organic disease may be looked upon as a proof of nephritis. Most writers deny the possibility of a physiologic albuminuria.

**Tests for Albumin:**—The detection of albumin is not at all difficult. Nearly every practitioner possesses a urinary test case and is prepared to test urine at the bedside. The simplest test of all is of course by boil-

ing the urine after the addition of an acid, but Heller's test is infinitely more satisfactory and quite as simple. Into a test tube pour a small quantity of nitric acid and allow an equal amount of filtered urine to flow slowly upon it. A sharply defined opalescent or white ring forms at the junction of the two fluids if albumin is present. Patients taking copaiba, turpentine and other oleoresins may pass urine which will give a similar reaction though free from albumin. In these cases the addition of a little alcohol will serve to dissolve the precipitate if non-albuminous. A faint pink ring appears if uric acid is present in any quantity; heat causes this to disappear.

Robert's Nitric Magnesium Test is, perhaps, the most efficient of all. One volume of colorless nitric acid is added to five volumes of a saturated solution of magnesium sulphate; this fluid is kept ready as "Test Fluid for Albumin." A small quantity of the mixture is poured into the test tube and the urine added as in Heller's test; the resultant ring is much more distinct, however.

### ACETONURIA

Acetone appears in the urine in health in infinitesimal amount, and in observable quantities in diabetes, wasting diseases—starvation, phthisis, cancer, etc.,—fevers, and occasionally diseases of the bowels. It is supposedly due to the high degree of albumin destruction; it is occasionally noted after etherization. *Test for Acetone:* Pour four c. c. of the suspected urine into the test tube; after rendering it alkaline with liq. potassa add three to five drops of a strong solution of sodium nitroprusside. The fluid turns red; add a few drops of concentrated acetic acid and if the color changes to purple acetone is present.

### HEMATURIA

Blood in the urine may be caused by several widely different conditions. Its presence in small quantities is only to be detected by the microscope but when freely present it turns the urine to reddish brown or even black. In females we must always remember the possibility of contamination with menstrual blood and withdraw a specimen of urine with the catheter. Hematuria may be present after the trauma, catheterization, during the course of infectious diseases; in cases of vesical calculus, purpura, hemophilia, tuberculosis (of bladder), carcinoma (any portion of urinary tract), ulcer, infarction (renal), severe congestion of the bladder or mucosa of the urethra, prostatic disorders, syphilis,



gonorrhea and renal diseases. The exhibition of such drugs as cantharides, turpentine, etc., may cause bloody urine. In some few cases there seems to be a congenital hematuria, several members of a family being afflicted. In all cases it is essential to discover the source of bleeding, and any treatment to be really effective must be based upon a clear understanding of the cause. Careful examination and questioning of the patient will usually serve to shed light upon the subject. In early life we would expect to find hemophilia (other signs plentiful), acute renal disease, tuberculosis, or cancer. In younger adults syphilis or gonorrhea must be looked for. In older people calculi, cancer, prostatic disease and stricture will have to be thought of as possible causes.

The use of the cystoscope and ureteral catheterization will serve to reveal the source of bleeding in obscure cases. Blood from the kidneys is well mixed with urine, and if a renal tumor exists, rest does not serve to lessen the amount. Pain is referred to the lumbar region. In stone in the kidney the pain is apt to be excruciating but paroxysmal, and the blood appears at intervals; rest relieves the condition. The amount of blood is usually small. If infection occurs the general health is affected and we have symptoms of sepsis. In tuberculosis of the kidney a small amount of blood intimately mixed with the urine is found. The tubercle bacillus and pus will generally be present in a 24-hour specimen.

Papillomata occasionally cause profuse bleeding; the cystoscope will reveal the condition often. Tuberculosis of the bladder resembles cystitis and is easily recognized. Here as in all cases where the bleeding is from the bladder or urethra the blood is bright red and appears in quantities at times. Pain is relieved by urination.

Vesical calculi may exist without causing hematuria; on the other hand profuse bleeding may be present; blood here appears after urination, which is apt to be stopped suddenly, pain in the glans penis is complained of in most cases. Prostatic disease is usually found after forty; the patient voids urine frequently and blood may flow at the beginning or end of the act of urination. In some old people varicose veins at the neck of the bladder set up dangerous hematuria. Examination is essential in each case. Several cases of hematuria have been reported after severe exertion. Bicycle and equestrian exercise may cause blood to appear in the urine; in these cases there is some degenerative condition of the mucosa and percussion over the renal region will usually elicit signs of tenderness. Parasites may also cause hematuria; the *filaria sanguinis hominis* and *distoma hematobium* being the known offenders.

A fairly safe rule is that blood from the bladder is passed at the end of urination (distinctive symptoms of bladder involvement also present);

urethral bleeding is evidenced by blood passing before the urine or with it, and renal hemorrhage can be augured when the blood is intimately mingled with urine which presents a smoky or brown color; casts and clots also appear in some cases.

*Heller's Test for Blood in Urine:*—If suspected urine is boiled with a solution of caustic potash, phosphates are precipitated which appear red from hematin. The microscope and spectroscope also detect blood in urine.

*Treatment:*—This evidently must vary with the condition causing the hematuria. In most cases rest is beneficial and demulcent drinks should be ordered. Certain cases sometimes puzzle the doctor; here the presence of blood is constant and yet no further signs of renal or other disease are discoverable. Renal hemophilia will perhaps best express this condition, which has recently attracted considerable attention. The free exhibition of ergotin, adrenalin or hamamelin has cured in several cases, when at the same time measures have been taken to improve the general physical tone and regulate circulation.

Having discovered the source of hemorrhage and taken steps to arrest it, the physician will naturally treat the cause. If calculi are known to exist we must discover their nature. Uric acid concretions will call for the free exhibition of calcium carbonate and salines, with free draughts of barley water. Phosphatic calculi will of course not be in any way influenced by calcium. Barley water, acidulated slightly, may however be given *ad lib.* For other treatment see "*Calculi-Vesical.*" Gallic acid in 3-10-gr. doses has given good results, especially if aqua cinnamomi is given at the same time. Acid sulphuric may be exhibited in cinnamon water with effect. The use of the oils of erigeron, eucalyptus, turpentine and santal is to be restricted to cases where the hemorrhage is from the renal pelvis. These drugs should never be used in nephritis. Hydrastinine, gr. 1-12 with arbutin or asparagin gr. 1-3-1, is extremely effective when the hemorrhage is due to congestion, and the effect is enhanced if small doses of atropine are given also. The use of preparations of the suprarenal capsule (adrenalin, suprarenalin, etc.), must be carefully restricted; these remedies increase arterial tension powerfully, and therefore must not be given where vascular pressure is already too high. Small doses of pilocarpine have given excellent results in some forms of renal hemorrhage. Creosote exerts a decidedly beneficial influence in tubercular hemorrhage although eucalyptol is better, and in engorged conditions with diseased mucosa chimaphilin or hydrastine will prove rapidly helpful. In nearly all renal, vesical or urethral diseases the indicated remedies may well be given with a good preparation of corn silk (*zea maidis*) or *triticum repens*. Tonics are



often called for. Nuclein with or without the arsenates of iron, quinine and strychnine, prepared blood-foods and digitalin, will of course suggest themselves.

Vesical irrigation with solutions of hamamelis, hydrastis or pinus canadensis, are frequently of great service; a return-flow catheter should always be used and only two to eight ounces of the fluid allowed to be in the bladder in any case.

*External Applications* of ice or of cold water over the kidneys when renal hemorrhage exists, and over the hypogastrium in vesical bleeding, will be of temporary use, but these applications should never be continued long. Cupping (dry) is sometimes to be thought of; the cups should be placed over the loins and used in congestive conditions only.

In stubborn cases of vesical hemorrhage (ulceration, etc.) a solution of silver nitrate gr. 10 to the pint will give relief, as also will a solution of alumol or alum, gr. 2-5 to the ounce. Iron perchloride is also recommended, the proportion being one dram to the pint. Sterile catheters and solutions are necessary. The persistent use of arbutin is very effective. Of late we have at our disposal a very simple but effective instrument called the Psychophore, which allows us to pass a constant stream of hot or cold water through the rectum. Iced water used in this instrument will often promptly stop prostatic hemorrhage.

## HEMOGLOBINURIA

Here, while the urine presents the same aspect as when blood is present, we find upon examination with the microscope that no red-blood corpuscles exist; hemoglobin alone being present. The urine may be pink, brownish, dark red or of a chocolate tint, and a sediment is deposited on standing. This consists of lithates with occasionally oxalate of lime. Just how the hemoglobin reaches the urine we do not know, but it is supposed to be set free in the blood prior to reaching the uriniferous tubules.

Hemoglobinuria is met with in three forms: toxic, paroxysmal and infantile. The first variety is caused by the ingestion of drugs which exert a destructive influence upon the blood; phenol, pyrogallie acid, potassium chlorate, naphthol and muscarine are specially prone to produce the condition, and we also meet with it in malarial fevers, scarlatina, syphilis (occasionally) and typhoid; the toxins reduced during the invasion causing dissolution of the corpuscles.

Paroxysmal hemoglobinuria is not a common disease but exists perhaps more often than is known. Extreme fatigue or exposure to a

cold rain, or falling into water, has caused the disorder to appear in certain individuals. That some obscure dyscrasia exists in these individuals is evident, and a course of iron and arsenic has been known to prevent such attacks. Malarial toxemia has been credited with being the cause, but there is no definite proof of this and it is more likely that hepatic disturbance is primarily responsible. The symptoms vary greatly; some people feel cold and languid and the extremities are wrinkled and turn blue. Anemia seems essential in malarial forms. Others again have urticaria or purpura, well marked, or the skin becomes icteric. In these cases the temperature is as a rule subnormal, and the pulse slow and compressible. More or less pain in the loins and over the liver is complained of. The attack lasts a day or more but is apt to recur.

*Hyoscyamine* is without any question the most effective remedy, and it should be given immediately upon appearance of the first symptoms. Those subject to the disease should be carefully protected from cold and warned not to over-exert themselves. Nuclein and the arsenates will prove the best tonics, with alternate doses of quinine hydroferrocyanite. Hydrastinine is also of service if continued for some time. Strychnine and capsicum with glonoin will cut short an attack. These remedies may be given with a hot drink, and the patient should have hot flannels applied to the body and be put to bed.

One of the peculiarities noticeable in many cases is that the stools become black. Examination of the urine often reveals serum, albumin, hemoglobin and a few erythrocytes. Palpation will show some enlargement of liver and spleen. A few doses of leptandrin and berberine, with fractional doses of calomel, followed by salines, speedily correct these conditions. In the intervals some albumin may be found in the urine. Glonoin gr. 1-250 every four hours will cause it to disappear and the exhibition of the remedies already suggested will prevent recurrence.

## CHYLURIA

This disorder is neither common nor well understood. One variety is due to the presence of the *filaria sanguinis hominis* in the blood; the ova of the parasite blocking the lymphatic communication between the distended vessels and some portion of the urinary tract resulting. Another form of chyluria exists however, in which fat presents in the urine without any discoverable cause. In chyluria the urine is milky and even a high-power microscope often fails to reveal fat globules, so complete is emulsification. Thymol in full doses is said to destroy the *filaria*, "



eucalyptol has also caused the condition to disappear. Occasionally the urine coagulates in the bladder and it becomes necessary to break up the clot with a solution of sodium bicarbonate, thrown into the bladder through a large catheter with an aspirating syringe. The disease is scarcely ever seen in America.

## PYURIA

Pus like blood may be present in the urine for some time without being detected. It may have its origin in the kidney, bladder, prostate or urethra, or be thrown into the urinary tract from remote abscesses. In every case the source of the pus must be discovered. In kidney disease it is often so intimately mixed with the urine that only the microscope or addition of liquor potassa will reveal its presence. When from the bladder or an abscess opening into the tract it is in flocculent masses or may be seen almost pure.

In cystitis the urine is usually alkaline; in pyelitis or other disease of the kidneys accompanied by production of pus it is acid. Prostatic abscess is distinguished by the pain in prostatic region and glans penis, and the passage of unchanged pus.

**Treatment:**—This naturally will be governed by the conditions present. The free use of calcium sulphide and the formates, or formin, will however be required in most cases. Urethral and vesical irrigations with  $H_2O_2$ , and mild solutions of the silver salts, will prove useful if the pus originates external to the ureters. In pyuria when the pus comes from the kidneys or flows into the bladder through a sinus it is positively essential to irrigate in order to prevent, if possible, infection of the latter viscus, though the tolerance of the bladder mucosa to pus is well-known. In all cases, even the worst, the persistent use of arbutin may be trusted to secure a cure.

## OXALURIA

The presence of oxalate of lime in the urine is normal. About a grain is probably excreted by a healthy adult each day. The crystals are easily recognized, being octahedral and colorless in the majority of cases, but occasionally presenting in the "dumb-bell" form. Some writers seemingly overlook this condition, which is as a matter of fact a serious one, for the continuous appearance of oxalates in any quantity bespeaks metabolic disturbances which are inimical to health.

Both oxaluria and phosphaturia are distinctly diseases of the quick-living modern American, and the physician should be ready to recognize

and stop the drain upon vitality which these conditions represent. The fact that many articles of diet contain oxalic acid, and that oxaluria is often present in people who consume such food in quantities, has been advanced as an argument against the existence of the oxalic diathesis. Vegetables, tea, cocoa, coffee and chocolate contain oxalic acid in greater or less quantity, spinach, rhubarb, cabbage, beets, potatoes and celery being particularly rich in the substance. Bread also has a certain proportion. The urine of the poor who eat the more common vegetables and drink bad tea abundantly is often loaded with oxalates, and these are the very people who can least afford to lose lime from the system.

An excess of oxalates taken into the economy must of necessity result in the voidance of a greater amount of oxalate of lime in the urine, but as a matter of fact the oxalic diathesis is not found so much among these people as it is among the hard-working, nervous, middle or upper-class individuals who eat well—but fail to nourish themselves.

As a matter of fact we do not know just where the oxalate of lime does come from, for oxaluria may occur in people who eat food containing little or no oxalic acid, and here we almost invariably find marked malnutrition, nervous phenomena of all kinds, and dyspepsia.

Take a patient who complains of pain in the back, weakness in the knees, lack of capacity to do things, nervousness, hysteria, irritability and loss of weight, with depression of spirits, and examine his urine, and it is probable that you will find oxalate of lime in quantities. It is altogether possible moreover that calculi will soon form in such cases, adding to the distress of the individual. That the oxaluria is due to deranged metabolism and causes ill-health is proven by the fact that proper treatment causes its prompt disappearance and a return to normal conditions.

That some urine deposits oxalates upon standing does not have any pathological significance. But if fresh urine shows day after day abundant oxalates, then there is nutritional disturbance which must be corrected at once. Pain over the bladder is frequently complained of by these patients, and the complexion is as a rule sallow and the tongue mildly coated; constipation usually prevails. As uric acid is quite often also in excess in the urine of oxalurics the various disturbances which may arise can well be surmised.

**Treatment:**—The first thing to do is to eliminate and restore general functional activity; the next to put the patient upon a generous mixed diet, insisting upon the consumption of plenty of meat, eggs, milk, etc. The exhibition of dilute nitrohydrochloric acid ten to fifteen minims in water after each meal, with strychnine, quassin or hydrastin before



eating, will often prove effectual, causing the entire disappearance of the oxalates. Much more must be done, however, if we would maintain health. The patient should take a small quantity of sulphate of magnesia each morning upon rising and indulge in a cool sponge bath with salt water preferably; then he should take a short but brisk walk before breakfast, which should be eaten slowly and consist of fruit, cereal, a chop, or two eggs, and coffee with cream. Some gentle but thorough system of exercises will help unless the patient takes plenty of ordinary outdoor exercise—which is seldom the case. Cars should be interdicted and the office man or woman should be told to walk one way at least. One hour before each meal juglandin gr. 1-6, or boldine gr. 2-67, or a tablet of nux vomica and capsicum, will prove excellent, with in anemia iron phosphate gr. 1-6. Papayotin gr. 1-3-1-2 may be taken after meals if digestion is impaired, or pancreatin and bilein combined will help if intestinal digestion alone is at fault—as it frequently is. Finally, twice a week these patients should take calomel gr. 1-10, podophyllin gr. 1-12 hourly for four doses after supper. In from two to four weeks the result will be a gain in weight of from four to ten lbs., improved capacity for work and brightened disposition. Surely, something well worth working for. The patient should present himself for further treatment if at any time the old symptoms reappear; it is a good plan to have the urine of oxalurics examined every three months. When duodenal or gastric catarrh is present also, copper arsenite, gr. 1-100 before meals, is specific.

## PHOSPHATURIA

We are confronted with two distinct forms of phosphatic urine; in the first amorphous phosphate of lime is deposited in the vessel after the passage of alkaline urine. The laity often mistake this for "gravel" and when the phosphate is deposited (as sometimes occurs) in the bladder, and is voided at the end of urination, the whitish material is apt to be mistaken for semen or prostatic fluid, neither of which really resemble it in the slightest degree. Authorities differ as to the importance of this condition, but when calcium phosphate is constantly excreted in large amounts there must be a systemic drain and nervousness and debility result.

Individuals presumably in perfect health sometimes void urine which upon heating precipitates calcium phosphate; it is not thought that calculi are apt to form in such cases but where the urine remains alkaline and the phosphates are found (upon making a quantitative analysis of the 24-hour output) to be present constantly in excessive quantity, it is

well to give ammonium benzoate and a course of alterative tonics for a few weeks. The diet should be changed and general hygienic conditions improved; a daily sponge bath with a solution of epsom salt solution (one ounce to the quart of water) as cool as is tolerable, followed by a brisk rub with a rough towel will do good. Fruit, fish (fresh), eggs and the glycerophosphates, or calcium lactophosphate, should be ordered. Quassin gr. 1-6, quinine hydroferrocyanate gr. 3-67, and xanthoxylin gr. 1-6, before meals, with a good digestant like papayotin, after eating, will usually prove useful.

A very useful formula is pulverized sulphur (resublimed) gr. 1-33, strychnine arsenate gr. 1-134, podophyllotoxin gr. 1-67, collinsonin gr. 1-134, hydrastin gr. 1-67; this may be given after meals, three to four such granules being the usual dose. Nuclein solution, four to eight minims, may also be dropped under the tongue, morning, noon, and night. In advanced cases where there are distinct evidences of nerve instability phosphoric acid (dilute) five to ten minims, may be given every four hours, or strychnine and phosphorus half an hour after food. Neuro-lecithin is also of service as a reconstructant.

The phosphatic deposits in ammoniacal urine bespeak an entirely different condition. In cystitis urea is acted upon by a ferment (bacterial) and we get as a result the triple or ammoniomagnesium phosphates; there is more than a probability that calculi will form if this condition is present for any length of time; indeed, the entire bladder mucosa may be covered with a deposit something like the "scale" which forms in boilers. It remains a question as to how the bacteria gain access to the bladder but given a residuum of urine—the viscus failing for any reason to empty itself, and ammoniacal decomposition ensues. As a result, if a cystitis does not already exist the condition is soon set up, and pus soon presents in the urine excreted. Catheterization is perhaps most often responsible for the infection, few practitioners not making a speciality of genitourinary work taking sufficient care to ensure asepsis. The dangerous habit of giving old men a catheter and allowing them to carry it about with them for use at any time and under any circumstances, cannot be sufficiently condemned. If self-catheterization is essential, the instrument should be kept in a solution of formalin, and wiped off before use with a piece of cotton soaked with a solution of eucalyptol and olive oil—1 part to ten.

The treatment in this form of phosphaturia is that for cystitis, which see. It might be remarked here, however, that weak solutions of nitric acid used locally unquestionably dissolve phosphatic deposits and give great relief to the patient. One of the best preparations the writer has



found is an aqueous solution of chloral and phenol. The two drugs are rubbed together and one dram of the resultant fluid is slowly mixed with a pint of distilled water. The bladder is drained and the fluid inserted through a rubber catheter, at a little above body-temperature. The patient is placed upon his back, abdomen and sides alternately, and the fluid is finally withdrawn. Three such treatments, following copious irrigation with boric acid solution, have cured some of the worst cases encountered in practice. Of late a solution of silver citrate (Credé) has been recommended.

### LITHEMIA; LITHURIA—"URICACIDEMIA"

Lithiasis or the deposition of lithic (uric) acid and urates in the urine is a term widely and often wrongly used to express the uric acid diathesis, whereas it really describes that condition which leads to the formation of uric acid concretion.

In gout, rheumatism and various other diseases we have a lithemic condition, excess of uric acid in the blood, and may have lithuria; though this does not necessarily follow, as there may be excessive formation of uric acid with retention. As soon as we get rid of the uric acid from the system—as such, or as amorphous or crystalline urates, we get amelioration of the symptoms caused by its presence.

*Lithuria* then expresses that condition (usually lithemic) in which the urine contains an excess of uric acid or urates, and here there is a tendency to lithiasis. Urine of this character is dark in color, heavy, and when cooled deposits a "brick-dust" sediment. Under the microscope uric acid is seen to consist of reddish-yellow rhombic prisms, or crystals of lozenge shape. Crystalline urates appear as needles, globular masses, or assume the dumb-bell form.

*Amorphous urates* appear as fine, dark-colored opaque granules. All of these substances are supposedly derived from the nuclein of cellular nuclei, and the free exhibition of assimilable calcium salts with nuclein serves to enable the system to withstand the drain and institute reparative processes. Great destruction of the cells having taken place the system is invariably loaded with an immense amount of waste—dead matter—hence it becomes a favorable field for the propagation of various pathologic bacteria. Here briefly, is one of the great facts of medicine; and he who appreciates it and institutes rational therapeutic measures in his uric acid cases, is able to obtain results which hitherto were deemed impossible. The use of arsenic, which favors fatty metamorphosis, is here intelligible.

**Test for Uric Acid:**—Upon a small porcelain dish evaporate a little of the suspected urine, and after adding a few drops of nitric acid (*fortior*) heat again to dryness. Cool and then add a drop of liquid ammonia; murexid is formed and presents a deep purple color. The urates appear in normal urine as quadriurates; in this form uric acid is physiologic; and when a departure takes place we get various morbid phenomena. It should be remembered however that some departure from the normal must have occurred to cause the change in the body chemistry. Hence it remains a question, which still is earnestly argued, whether uricacidemia causes certain diseases or is caused by preëxisting pathologic conditions.

It is probable that certain metabolic derangements tend to the formation and retention of uric acid, and the presence of this substance in the blood-stream unquestionably sets up various disorders which the physician is called upon to remedy. Rarely indeed is he sent for to correct the wrongs which lead to uricacidemia—and unhappily when he is, he too often fails to recognize and treat them properly. We find increased urates in the urine of healthy men who have exercised excessively and perspired much; sometimes also there is an excess in diarrheal subjects. Free ingestion of nitrogenous food may also cause an excessive output of urates. In none of these cases has the excess any pathologic significance.

But when there is interference with oxidation or disturbance of metabolism, the presence of urates or uric acid in quantity means much. We find this excess in gout, high continued fevers, certain pulmonary diseases, leukemia and chronic indigestion. Prompt elimination, stimulation of the hepatic and renal functions and a limited chemically-correct dietary, will help us restore a normal state of affairs. In all such disorders the skin should receive attention and the excretory activity of the sudoriferous glands be accentuated. Daily salt or magnesium sulphate sponge baths, followed by alcohol rubs, are exceedingly useful.

The practitioner should remember that free uric acid is invariably a morbid product, met with as a crystalline body in the urine, and in the form of gravel or calculi in the urinary tract. Under certain circumstances the physiologic quadriurates (potash, soda and ammonia), which are extremely unstable, become decomposed in the body, uric acid is set free and as a result concretions are formed. Uric acid itself is extremely insoluble and concretions once formed are with difficulty disposed of.

We are familiar with the fact that nearly all urine if kept from decomposition will sooner or later throw down uric acid. Were it not for the salts and pigments present in the urine which act as inhibitory



agents uric acid would be voided generally and stone in the bladder would be as common as measles.

The necessity for a sufficiency of saline constituents in the diet of sedentary people who live close is evident. Milk, meat, fish and fruits contain a large percentage of mineral salts, while bread, potatoes and oatmeal—the chief food of the poorer classes (together with meat of poor quality, often salted or smoked), are deficient in this direction. The well-to-do overeat often, and elimination in their case is generally wretched. They do not perspire or in any way stimulate oxidation, are apt to be constipated and thus throw a severe strain upon the kidneys. Hence we find nephritis most often among the very rich, or the poorly nourished indoor workers.

Roberts says rightly: "High acidity, poverty in salines, low pigmentation and high percentage of uric acid, tend to the precipitation of uric acid, while depressed acidity, richness in salines and pigments, and low percentage of uric acid, tend to retard precipitation."

In chronic nephritis we have urine of low specific gravity, almost devoid of color, and the absence of pigment here probably accounts for the tendency to precipitation of uric acid. This, of course, applies only to the interstitial form.

In other chapters of this work the constitutional effect of excessive uric acid is considered fully, but it is well to state here that while in gout and other uric acid diseases the precipitation of acid takes place in the blood and tissues in the form of sodium biurate, in lithiasis, uric acid is deposited free while in an excretion still in contact with the urinary passages. The two processes are far from being identical, and in the latter disorder we should devote our attention to modifying the urine. In lithemia we must institute constitutional treatment and correct the metabolic wrong which exists.

During sleep and when digestive processes have ceased, the amount of urine secreted is reduced and the acidity increased. During the digestion of food opposite conditions obtain. We shall therefore find that the early hours of the morning are most favorable to deposition of uric acid as during sleep the urine is abnormally rich in urates and the urinary current slow and scanty.

It is therefore desirable to have patients of this class take a glass of water containing five to ten grains of sodium or potassium bicarbonate on retiring; and on waking a saline is indicated. Magnesium sulphate is especially useful. If rheumatic or gouty tendencies exist also the addition of colchicine and lithia will be desirable. Salithia is therefore an almost ideal saline here.

Potassium citrate is not preferable, as many practitioners think, as it is essential to relieve the gastric acidity which almost always is present in lithemic conditions.

Small meals often are to be preferred, as the urine after food is usually rendered alkaline, and if we give with meals a little milk and water, or better still milk and barley water, slightly salted, we shall have done a good deal towards preventing the formation of uric acid. The patient should consume a reasonably large quantity of either pure or slightly alkaline water during the day, but calcium carbonate with lithia and a minute quantity of colchicine, as combined in Calcalith, will prove the best medicinal agent in most instances. Ten to twenty grains may be exhibited every four hours, with a glass of water. Exercise, the Epsom salt bath and general hygienic measures, have been already mentioned. It may well be mentioned here that German clinicians have recently obtained some almost phenomenally good results in lithiasis, from the exhibition of large doses of glycerin; from one to four ounces is exhibited with an equal quantity of water, between meals, for several days. The urine becomes oily, the specific gravity is raised, and in most cases pain ceases promptly. Calculi were voided in over 60 per cent of the cases treated.

### ACUTE DESQUAMATIVE NEPHRITIS

This is an acute inflammatory process which involves particularly the lining epithelium of the renal tubules and glomeruli. The three varieties are tubular, glomerular and interstitial, but it is as a matter of fact impossible to distinguish one from the other clinically.

**Pathology:**—The kidney, post mortem, is found to be swollen and the capsule is non-adherent; early the organ is deep red but later becomes mottled though the Malpighian tufts retain their deep red tint; the tubules are blocked with desquamated epithelium, blood-corpuscles and serum-albumin; the vessels are dilated, their walls degenerated and extravasations of blood are not infrequent. The cloudy swelling which first affects the epithelium later becomes a distinct fatty degeneration. The interstitial tissue is infiltrated with leucocytes in abundance.

Patients seldom die early, but from the few cases examined it would seem that there is intense hyperemia with inflammatory exudation containing red blood-corpuscles and leucocytes. Circulation in the Malpighian tufts is interfered with and nutrition suffers, the epithelium of the glomeruli swells and undergoes fatty degeneration, and finally the convoluted tubules become more or less occluded with the products of



inflammation and waste. Excretion is lessened—sometimes stopped—and toxins which should be excreted in the urine are thrown back into the blood.

**Etiology:**—Acute nephritis may be caused by exposure to cold and wet, pregnancy, the acute infectious diseases (especially scarlatina), the ingestion of poisonous drugs (turpentine, copaiba, cantharides, phenol), extensive burns or skin diseases, and alcoholic excesses. Occasionally it is impossible to account for a nephritis.

**Symptoms:**—These are at first vague but later distinctive. Usually there is some rise of temperature, but occasionally this feature is lacking till late. There is pallor with puffy swelling of the face (especially about the eyes on rising in the morning), edema of the ankles, lumbar pain, nausea and sometimes vomiting. Chills and rigor may be present. Anemia increases steadily. The dropsy, headache, furred tongue and anorexia, together with obstinate constipation complained of by patients with well developed cases, only too frequently presage uremia.

The urine is scanty (it may be entirely suppressed), smoky or high-colored, with a sp. gr. of 1025–1030, and contains albumin, blood-corpuscles and epithelial, hyaline and blood casts. Some granular casts may be noted also. The output of urea is markedly decreased.

Occasionally we get pronounced and diffused anasarca, typical urine, and all the symptoms of the disease, and yet improvement is noted daily even under indifferent treatment.

But when the skin is dry and harsh, and effusion takes place into the serous cavities, and we find the aortic second sound augmented, we can only offer a guarded prognosis. In some cases an examination of the urine alone will reveal the disease, and in pregnancy uremic convulsions often give us the first knowledge of its existence.

In the vast generality of cases the symptoms are for a time slight, even when the urine is markedly pathologic. History, and the absence from the urine of fatty casts, will enable us to distinguish an acute from an exacerbation of chronic parenchymatous nephritis.

**Prognosis:**—Always guarded. Uremia may develop suddenly and kill. In severe—or rather typical—cases, death may follow from exhaustion or edema of the lungs. The disease may become chronic. As a rule acute nephritis runs its course in from two to six weeks, and ends in recovery.

**Treatment:**—Rest and milk diet will save many cases if seen early enough. If we are called only when urine is suppressed, or uremic toxemia threatens or exists, we must institute heroic eliminative measures. These are fully described under the head of "Uremia."

A clear conception of the conditions present will enable us to take effective therapeutic steps. First we must endeavor to divert the blood from the congested kidneys; relieve the strain upon those organs by increasing the activity of the skin and bowels, and flush the tubules with non-irritating fluids. At the same time it is well to remember that the system itself is loaded with toxic matter which requires removal before normal functioning can be looked for.

By exciting the intestinal mucosa and skin to double duty we not only lessen the work of the kidneys but also divert a large proportion of the blood, while at the same time we get rid of retained urinary excreta and reduce vascular tension. Under ordinary conditions then we shall give small doses of atropine to relieve congestion and flush the capillaries; exhibit salines, subsequent to small divided doses of calomel and podophyllotoxin (gr. 1-6 each every hour for four doses every other day) to insure free watery stools; and also give veratrine and glonoin with benzoic acid with free draughts of water to flush the tubules and remove epithelial debris. The patient is sponged twice daily with a solution of magnesium sulphate, one dram to the quart of water. Three pints of milk should be consumed daily, the patient chewing each mouthful before swallowing it. High enemata of weak saline solution are given morning and night, and gr. 1-67 of strychnine nitrate, or brucine, exhibited every four hours. In many cases this will be all the treatment required, though it is usually well to add nuclein in eight to ten-drop doses three times a day.

In cases where urine is scanty and dropsy distinct, we may perhaps take more energetic steps at once. The patient is placed in the wet pack or hot bath—the pack however being infinitely more efficacious, as described in the chapter on uremia. Pilocarpine may be injected hypodermatically—gr. 1-10 to 1-6. At the same time the exhibition of elaterin is begun; gr. 2-67 every hour for four doses. Menthol gr. 1-12 should be given with each dose. After one hour, the patient having perspired profusely an enema may be given (which should be voided into a bed-pan) and the patient placed in a warm dry bed. The elaterin should be continued till four doses have been taken. Free watery stools will follow, and the treatment already outlined will as a rule serve to maintain the effect. However in some cases apocynin may be necessary; gr. 1-6 every three hours. A hot bottle or mustard plaster may be applied over the kidneys if pain is complained of, but the osmotic glycerinized pastes now employed are much more satisfactory. Harsh purgatives are rarely if ever admissible. Salines and the drugs mentioned, with enemas, will do all that can be done. Where the pulse is



and bounding, veratrine in small repeated doses speedily gives results; gr. 1-134 every half-hour for four to six doses usually suffice. Where the arterial tension is low and heart-action labored and feeble, caffeine may be employed, best hypodermatically in a solution of sodium benzoate. Gr. 3-5 caffeine with a like quantity of sodium benzoate should be dissolved in thirty minims of distilled water and injected. The usefulness of cactin must not be forgotten. This drug strengthens heart-muscle by increasing the circulation in the coronary arteries, and also exerts a direct stimulative action upon the vasomotor and spinal motor centers.

Cactin acts directly upon the cardiac plexus, increasing the contractile energy of the heart and improving its nutrition. It is the heart- tonic of choice where we seek strength without irritation—gastric or cardiac. This drug may be depended upon in the later stages of nephritis—not as a diuretic, for it possesses no distinct diuretic action—but as a cardiac brace which will serve to maintain life while we combat the toxemia which threatens to destroy vitality. Gelseminine and chimaphilin are two useful drugs in acute nephritis. The first should be given in small doses (gr. 1-250), when the eye is bright, the skin dry, the urine scanty and red and face flushed, with a quick, small pulse. Alternated with strophanthin or sparteine the skin moistens, the pulse becomes soft and copious discharges of urine occur.

Arbutin and eupatorin (the latter the active principle of the old familiar “bone-set” of our grandmothers), may be given with water, several times daily, after the more urgent symptoms have been controlled; gr. 1-6 of each will prove the most useful dose, repeated every 2 to 4 hours. Nephritic patients should wear flannel next to the skin and avoid sudden changes of temperature; the lungs should always receive careful attention, as not infrequently they become affected.

In extreme cases it may be necessary to make incisions in the tissues about the ankles. Southey’s tubes (small silver canulæ) are often inserted, but as a general thing multiple scarifications through the skin will suffice. Iron arsenate, quinine and strychnine, or brucine, will be the best tonics for the recovering patient. The writer gives also a pill containing iridin (from *Iris versicolor*), eupurpurin (from *eupatorium purpureum*), eupatorin and apocynin, a gr. 1-12, four times daily for several weeks.

## CHRONIC DESQUAMATIVE NEPHRITIS

This is the tubal or catarrhal type of nephritis, represented in the early stages by the large white kidney, later by the small white or con-

tracted form. The large red or variegated kidney is a hemorrhagic form. This sometimes follows acute nephritis of scarlatina or pregnancy, but more frequently arises *de novo*, its origin and beginning being wrapped in obscurity. Young men are more liable, especially the drinkers of beer. Exposure to cold and wet have been noted in connection with it, and have been assumed to be causative, without proof. More probably the continued action of blood toxins is responsible, the delicate textures of the kidneys being unable to withstand such irritation for unlimited periods.

The symptoms are insidiously developed, and frequently the patient has no suspicion that his kidneys are affected until it is revealed by a life insurance examination. In other cases there is a growing tendency to anemia, debility, anorexia, dyspepsia, headache, dullness, pallor, the patient retaining his weight but losing his color, the face becoming pasty and pimply, the body flabby. In other cases the man may be the picture of ruddy health, bright eyed and happy. Edema appears at evening about the ankles, or the patient finds his shoes uncomfortably tight then, and in the morning his eyelids are swollen. The urine is slightly decreased, increased or normal in quantity, the *s. g.* corresponding. Examination discloses the presence of albumin in moderate or large quantities, with casts, epithelial at first, becoming fatty and hyaline as the tubes are deprived of their lining. Edema increases and may become general. Dyspnea occurs from the toxemia long before it is occasioned by the filling of the thoracic serous cavities. Bronchial and other catarrhs are common. Uremia is not a usual phenomenon in this form. Neuroretinitis is frequent in advanced stages. The tightly stretched skin of the legs may become eczematous or erysipelatous if broken or cut. The course depends largely on the treatment. Properly managed, with an obedient patient and suitable means, it need not shorten life. This is not the prognosis of the textbooks, but the following case is significant: In 1877 the writer attended a case, diagnosed as desquamative nephritis by S. Weir Mitchell; the lady is still, in 1906, enjoying good health.

The diagnosis is made by the presence of a medium quantity of albumin with epithelial and granular casts, later becoming fatty and large hyaline, with the progressive anemia and hydremia described. Methylene blue is arrested in the kidney and not eliminated by it as in health.

The writer clings to the milk treatment, which has afforded him satisfactory results in this form of nephritis for a third of a century. The patient must be restricted to skimmed milk alone, a half glass every four hours, night and day, half an hour to be consumed in the mastication and ingestion of this quantity. At first the patient will feel as if this was



not enough to sustain life, and he may take more if he takes it in manner and time prescribed; but biliousness will soon warn him of excess, and he will settle to about the quantity suggested. The milk is to be taken with a teaspoon, and each spoonful held in the mouth and chewed until thoroughly incorporated with saliva. As the milk grows distasteful it may be varied by substituting fresh sweet buttermilk, junket, whey, or koumiss, in similar quantities. Once a day instead of milk an equal quantity of freshly pressed fruit juice may be taken. Water may be drunk also if the dropsy does not forbid. This regime is to be sustained until the albumin has disappeared from the urine for one month, when we may begin cautiously adding small quantities of the simplest foods, such as toasted stale bread, zwieback, crackers, rice and other carbohydrates. The fruit juices may be increased also, and a little coffee allowed. Following these if albumin does not reappear, the order in which foods are to be added is: Fresh fruits and vegetables but not any that contain volatile oils like cress or oxalic acid like tomatoes; eggs, fish, oysters, chicken, turkey, beef, mutton; pork, veal, dry beans and peas as well as cheese being long prohibited. Alcohol is to be left forever out of the nephritic's diet list.

The writer believes that the daily use of one to three grains of arbutin, and as much benzoic acid, has an influence in gradually restoring the diseased epithelium to health, and this is the only direct or dominant medication advised. High tension is not common but demands the addition of just enough veratrine to restore normality in this respect. Low tension and debility may require sparteine or digitalin. Anemia calls for iron phosphate, a grain a day in the drinking water. Basham's mixture is advised by every textbook, but we have never been able to find a physician who could testify to benefit derived from it. Beyond this the treatment is that of symptoms, and of intercurrent maladies. The presence of red blood cells in the urine is met by the arbutin amply. The bowels must be swept out daily by a morning saline, as toxins from retained feces cannot but work disastrously on the diseased renal tissues.

## CHRONIC INTERSTITIAL NEPHRITIS

We have here to deal with a malady in which the connective tissue develops at the expense of the cellular structure, a true hyperplasia and cirrhosis, in fact. The kidney is small and contracted, the cortex composed largely of hyperplastic connective, the pyramids also contracted. The arteries are sclerosed, the heart hypertrophied.

The malady begins in midlife, more in males, is hereditary; follows uric acid, lead and alcohol poisoning, syphilis and malaria, and the toxemia seen in those who habitually eat and drink too much, the gouty, rheumatics, and persons over given to worry and anxiety. The cold moist climate of New England and the Middle States conduces to it. (Purdy.)

This form of nephritis is even more apt to be latent than the preceding. Evidences of uremia may suddenly develop during some intercurrent fever, or independently, or after some unusual exertion or exposure to cold and wet. But headaches have been common, with dizziness, anorexia, debility, perhaps unpleasant force in the heart-action or throbbing of the arteries, all of which may become evident to the patient's sensation. Nausea, dyspnea, a tense wiry pulse, and sometimes convulsions of *petit mal* type and unnoticed by the patient, may occur. After an attack of uremia the symptoms increase and debility becomes more evident. Urination is more frequent, and the sight fails. Spasms of dyspnea—renal asthma—occur. The urine is increased in quantity, pale, the s. g. falling perhaps to 1002, with never more than a trace of albumin and often not that, the excretion of solids being scanty. There may be a few hyaline or granular casts and leucocytes. The freezing point of the blood is lowered by the presence of substances not excreted, the arteries are like cords, the heart hypertrophied. The second aortic sound is accentuated. Epistaxis is common. Edema may suddenly occur, over night, in parts where the local obstruction theory will not apply—in the larynx, ear, prepuce, lip, lungs, etc. Occurring in the brain it may cause coma, but we cannot accept the theory that all uremic coma is due to this cause. The dyspnea increases in frequency and is worse at night. Cerebral apoplexy or pulmonary apoplexy may occur. Retinitis may be an early symptom. Tinnitus, deafness and vertigo are common. Diarrhea may give relief for a time.

The diagnosis is made by the tense pulse, hypertrophied heart, and urine of low specific gravity and scanty excretion of urinary solids. The absence of albumin and scarcity of casts are significant. The occurrence of uremic symptoms in persons deemed healthy is to be noted. Epistaxis in middle aged or elderly men who have lived better than wisely should lead to an investigation of the renal excretion.

The prognosis is uncertain and should be guarded. Life may be prolonged for years, but the patient may at any time suddenly develop uremia or fall with apoplexy. Progressive symptoms are ominous.

The treatment seeks first to raise renal excretion to the highest point possible to the scanty remains of renal tissue. The bowels must be



kept free and disinfected, the use of foods containing irritative substances excluded, especially the volatile oils, alcohol and meat extractives. Cut out condiments and spices, eat little meat and that best boiled, without the soup. Milk in all forms is good, and fruit juices; carbohydrates in moderation, albumenoids always sparingly, alcohol—shun as you would a rattlesnake. Take to the skimmed milk diet whenever uremia threatens.

The great remedy is veratrine. This should be taken in doses sufficient to restrain the vascular tension as closely as possible to the normal point. Nothing better illustrates the superficiality of the ordinary professional knowledge of therapeutics than the unanimous advocacy of the nitrites for this indication. None of them exerts an action sustained more than a few minutes, and this is unsuitable for a malady where such action should be sustained for months and perhaps years. Veratrine enables us to do this with certainty and without a single disadvantage. It is sure, safe and devoid of all unpleasant effects. The dose is gr. 1-134 well diluted, every half hour when uremia threatens and every mealtime in ordinary times, increased until the desired effect is secured. The local irritant effect is manifested by a sense of warmth marking out the limits of the stomach, and this usually indicates the presence of acute catarrh. Veratrine so fully covers the indications whenever abnormal tension is present that there is scarcely a variant needed. Syphilis and malaria call for their own remedies.

## PART VIII.

# DISEASES OF THE NERVOUS SYSTEM

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### I. DISEASES OF THE PERIPHERAL NERVES

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#### NEURALGIA

Neuralgia is a malady characterized by periodic paroxysms of pain affecting the course and distribution of one or more nerves, tending to recur in the same nerves and gradually extend to others in proximity or on the opposite side, inveterate cases being attended with the development of tenderness at the points where the affected nerves pass through bony or fibrinous foramina; also with patches of cutaneous anesthesia, and trophic changes in the affected integument.

**Etiology:**—A predisposition to neuralgia exists in the neurotic descendants of drunkards, syphilitics, consumptives, the insane, or in fact of any persons affected with neurotic or cachectic disease. Any mode of life which leads to mental or physical debility increases or arouses the predisposition to neuralgia. In like manner, any cause of mental or physical depression is capable of bringing on a paroxysm, the tendency increasing with each. Any nerve in the body may be affected by neuralgia. The attacks at first occur on one side only. If one nerve of the face is thus affected neighboring nerves may in time be similarly attacked until the entire half of the face is throbbing with exquisite agony; or the same nerve on the opposite side may be affected in time. Nerves frequently thus affected are the supra and infraorbital, maxillary, facial, great occipital, intercostal, intercostohumoral, cardiac, lumbar and sciatic. Affecting the skin, the irritation may occasion an afflux of blood which is sometimes mistaken for erysipelas. Affecting the optic nerve, the trophic changes may impair or destroy vision. The pain is usually sharp and lancinating. Pressure gives relief, excepting at the painful points above mentioned. Tactile sensation is diminished over the affect-



ed area. The paroxysms may last a few hours or continue for days, tending to become more prolonged until they may be finally continuous if not relieved. The domain of neuralgia has been markedly circumscribed of late, since careful study has shown that in many instances the pain is dependent upon local lesions, such as tumors, spiculæ of bone and other substances infringing upon the nerve in some portion of its course. Many other cases have been found to be dependent upon autotoxemia, which indeed is one of the most potent causes of true neuralgia. It is probable that in every case of this malady, however, there may be found degeneration of the posterior roots of the nerves involved. The painful spots are easily explained: The irritation due to the pain results in an afflux of blood, and this hyperemia gradually develops hyperplasia of the connective tissue elements, and as the lumen of the foramen remains the same, the nerve is pinched, and tenderness with tendency to continuous pain gradually develop.

Facial neuralgia is more frequent in women and is frequently caused by cold and wet. *Tic Douloureux* signifies a very severe form of this malady, often accompanied by facial spasm. There is usually some neuritis in the branches of the fifth nerve and degeneration of the Gasserian ganglion. Intercostal neuralgia is especially common in women, attending myalgia of the intercostal muscles, due to degeneration caused by the use of the corset. In herpes zoster we have an eruption of small vesicles in the skin to which the affected nerve is distributed in addition to the neuralgic pain. The neuralgic skin is sometimes exquisitely sensitive. Affecting the heart the disease is known as *angina pectoris*. This malady is treated at length in the section on heart-diseases. Affecting the sciatic nerve it is known as *sciatica*. In many cases of this malady the rectum presents spasm of the sphincter, hemorrhoids, ulcers, fissures, fistulas or other lesions. Neuralgia of the anterior pleural nerve is less common. Visceral neuralgias are obscure and doubtful. Most of the cases formerly so called are now known to be symptomatic of structural lesions. Each of these is treated in the section devoted to diseases of that organ.

The diagnosis of neuralgia is important and not difficult. A paroxysmal, non-inflammatory disease, at first unilateral, tending to recur in the same nerve, spreading in time to other allied nerves, developing in time anesthetic patches and painful points, induced by any cause of depression and attended by trophic disturbances, without ascertainable local disease. The disease is to be distinguished from rheumatism, myalgia, neuritis, and the pain due to structural lesions infringing upon or transmitted along nerves.

The prognosis is better the earlier the neuralgia is recognized, its true nature and causes comprehended and effective treatment instituted. Many cases end in the slough of alcohol or the morphine habit. When the disease has become inveterate a cure is more difficult, yet we doubt if there be such a thing as an incurable neuralgia.

**Treatment:**—The causal treatment is to be based upon a study of the case. The special causes are to be removed, the strength of the patient invigorated by whatever measures may be indicated. We thus find ourselves called upon to treat anemia on the one hand, the various dyscrasias on the other. We have to regulate the digestion, following Anstie's suggestion that neuralgics require one-third more food than ordinary persons, but adding to this that the food to be beneficial must be digested and assimilated. By keeping the bowels clear of fecal accumulations and disinfected, by regulating the diet and insuring the proper digestion of the food, by insisting upon proper exercise, bathing and other points of personal hygiene, we cut away the foundation upon which neuralgia is built. When we have reason to believe that degeneration of the nerve roots is present, and Anstie claimed it was always present, the phosphide of zinc is a specific. To an adult give gr. 1-6 four times a day, at least one hour before meals or three hours after meals, and within two days the benefit will be manifest. Besides this, iron, quinine, strychnine, cod-liver oil, arsenic, and nitrohydrochloric acid are each useful when taken in the intervals, by patients whose condition requires one or more of these remedies. We do not believe in specifics for neuralgia, but we do believe in specifics for the cases in which each of these remedies is indicated specifically.

We now come to the treatment of the paroxysms: Begin by clearing out the stomach and bowels; apply warm applications to the affected region; in some cases cold gives greater relief, although this is unusual. A mild galvanic current is one of the surest means of securing prompt relief, but only when applied in the following manner: Supply the patient with a five-cell battery and instruct him as to its application. When he is seized with the paroxysm let the positive pole be applied to the painful region, the negative being applied indifferently to any other part, and pass the current through until relief follows. The pain will recur in a short time, when the current is to be reapplied; and this is to be continued until the paroxysm has been extinguished. I have thus treated a neuralgia of such gravity that a morphine habit of ten years' duration had been established. If untreated the paroxysm would endure for a week until the patient was forced to resort to morphine, but by the use of galvanism the paroxysm was broken within 24 hours. The first required more than



thirty applications of the current, but each succeeding one required less until two or three sufficed.

When the skin is cool and shrunken, the pulse tense and contracted, the patient depressed and the pain intensified by light and noise, the remedy is hyoscyamine, gr. 1-500 in a spoonful of hot water, repeated every five minutes until relief or dryness of the mouth occurs. By this remedy the vasomotor spasm is relaxed, the blood released from the engorged centers and returned to the skin. Very severe and obstinate attacks are also broken up by zinc phosphide, strychnine arsenate and quinine, given separately or together in full doses. These remedies completely obviate the necessity for the use of opiates or the depressing coal-tars in the relief of neuralgia.

Whenever the painful point can be made out, relief will be afforded by a blister placed exactly over the foramen. This is especially the case in dealing with sciatica, although here the first indication is to treat the rectal malady. It will also be found in inveterate sciaticas that the nerve is encumbered by lymph exudations, and these should be removed by persistent massage and the use of the most powerful absorbents. Lumbago may be neuralgic, but is nearly always myalgic. Intercostal neuralgia usually combines both elements. Here great benefit is experienced from massage with hot cod-liver oil in case of emaciation, and the application of a mild faradic current, the positive pole, the current too mild to cause pain. By these means a fair amount of development may be afforded to the degenerated muscles and nerves, if the corset is laid aside and judicious exercise also employed.

In the treatment of neuralgia better success will be attained if the remedies employed are administered at once in full doses, whereas if timidly dribbled into the system the body will become habituated to them without making much impression upon the disease. It will also be found that when a paroxysm has been promptly and effectively treated the next one will yield more readily, especially if proper hygienic measures have been adopted in the interval.

## HEADACHE

The causes of headache are so multifarious that a list of the more common ones only can be given. These include toxemia from overwork, infectious diseases, tea and other external drugs, autotoxemia in all its phases; anemia and hyperemia, organic disease of the brain or its membranes, neuralgia; reflex irritation; passive congestions; and insufficient elimination. Perhaps the most common form is migraine, or

sick headache. This is an autotoxemia, sometimes of neuralgic type but more frequently bilateral or affecting the entire cranium. The patient awakes with a feeling of heaviness or depression, a dull pain about the eyes extending through to the occiput. The origin is generally denoted by bad breath. The pulse is small and contracted, of cord-like tension, the skin and extremities pale and cool, the pupils contracted. The pain gradually increases, being rendered worse by light, sound or motion. Towards the middle of the day the tension relaxes and the face may flush somewhat, the pain assuming a throbbing character so that the patient frequently speaks of splitting the head open to get relief. At the point of greatest depression there is apt to be nausea or even vomiting; and if this occurs spontaneously relief gradually ensues. While this is due to the absorption of toxins from the bowels it is not directly relieved by cathartics, whose first action being to liquefy the stools, toxin absorption is increased. Nevertheless it is impossible to get rid of the offending matter without emptying the bowels. It would seem, therefore, that the most direct method of giving relief would be to administer charcoal, which would absorb the toxins in the stomach and upper bowel, inducing catharsis meanwhile by the use of strongly exosmotic enemas, such as an ounce or two of pure glycerin, or eight ounces of saturated solution of table salt, either of which if thrown into the colon will promptly excite exosmosis and catharsis without favoring absorption from the bowel into the blood. A very effective temporary remedy is a hot mustard foot-bath, which relieves the cerebral congestion and often completely stops the pain, giving the patient relief until elimination can be effected. Prevention lies in the proper regulation of the diet and personal habits.

Headache is never a disease, but always a symptom and a symptom whose treatment is so absolutely that of the cause of disease that we deem it unwise to further consider these cases separately.

### MENIERE'S DISEASE

This is a disease of the labyrinth of the internal ear, of the auditory nerves or its centers, with progressive deafness and vertigo. The nerve-ends may be inflamed or atrophied. It is rare before 30.

Vertigo is the most prominent symptom and is quite marked. Tinnitus is also present. Great difficulty in walking is experienced, the dizziness increasing whenever the patient rises. The general health fails also. There is anorexia and sometimes persistent vomiting. When the deafness has become complete the vertigo ceases. Nystagmus, diplopia and brief loss of consciousness may occur.



The diagnosis is easy. The prognosis is doubtful and becomes worse as the disease progresses; the general health improves when deafness becomes absolute. Some cases recover.

**Treatment:**—Quinine has proved useful; begin with small doses and continue until cinchonism results. Solanine would probably prove useful. Hirt recommends pilocarpine, and Zinckler ergot. Either drug should be pushed to full physiologic effect. Zinc phosphide should be tried to combat the degeneration. Eliminate, apply blisters over the mastoid process, treat any cachexia present. Gowers advises salicylates. Anders suggests apiol and glonoin. The alimentary canal must be emptied, disinfected, and kept clear and clean.

## DISEASES OF THE CRANIAL NERVES

The olfactory nerve may be irritated by a tumor or other cause of compression. This may occasion hyperosmia or increased sensitiveness of the nerve, while any destructive process causes anosmia. Perversion of the sense of smell is sometimes manifested. The diagnosis is as to the cause of the symptom. The prognosis and treatment depend also on the cause.

Optic neuritis attends most tumors of the brain. Optic atrophy may be primary or secondary to degenerations of the nerve root, such as occur in ataxia. Atrophy dependent on neuritis is usually preceded by choked disk. Hemianopsia is generally due to unilateral lesions in the optic tract. Wernicke's sign, inaction of the pupil, indicates a centric lesion, but if this is behind the thalamus this sign will not be present. Lesions involving the outer fibers of the tracts passing to the optic nerve cause binaural hemianopsia. The bitemporal form results from destruction of the anterior fibers of the commissure, as in acromegaly, while the horizontal form is caused by an affection of half the nerve or tract above or below, producing blindness in the upper or lower field. Hemiopia indicates disease of the retina on the same side. Hemeralopia is due to retinal disease; nyctalopia is generally syphilitic.

The treatment mainly depends upon the cause. Galvanism is sometimes useful. A popular remedy sometimes useful consists in plunging the face into a basin of cold water and opening the eye so that the water laves the ball. This is repeated a number of times daily. It can readily be seen that the stimulation of the circulation due to the reaction may favorably influence the nutrition of the organ. The eye should be relieved of strain by the proper fitting of glasses and such other measures as may be indicated.

Paresis of the third nerve produces nystagmus, protrusion and ptosis. The external or internal muscles may be alone affected. The causes are basilar meningitis, syphilis, neuritis and traumatism. The causal malady is to be treated, exudation removed by stimulating absorption, followed by full doses of strychnine to arouse the nerves.

Paralysis of the patheticus is due to similar causes; the eye turns up and in.

The trifacial nerve is more prone to disease and causes more suffering than any other. The lesions may be central or peripheral. If the lesion is supranuclear the reaction of degeneration is absent; but this is rare.

Internal strabismus from paralysis of the sixth nerve is generally caused by neuritis.

When the center of the facial nerve is diseased we have spasm at first, followed by paralysis on the side opposite to the lesion. The nerve itself is not degenerated. The corrugator muscle is not affected. Lesions of the nucleus are usually bilateral, due to hemorrhage or syphilis. Spasm occurs, followed by paralysis and the reaction of degeneration. Peripheral lesions may be intracranial, intraosseous or extracranial. The paralysis is usually unilateral. The causes are exposure to colds and drafts, traumatism, or diseases of the ear. The symptoms develop suddenly, the patient waking to find the paralysed side of the face motionless; the wrinkles disappear, the mouth draws to the opposite side, saliva dribbles, chewing and swallowing are difficult. Anesthesia is rare. Taste is unaffected. The duration is from six to twelve weeks, depending on the extent of the neuritis and degeneration. Disease of the middle ear may attend or exist separately. The sense of taste is also affected in such cases, on the anterior two-thirds of the tongue on the affected side, from implication of the chorda tympani. If the tuning fork is heard better through the ear than over the temporal bone the internal ear is affected. If the lesion is intracranial deafness and vertigo are present, the former indicating disease of the vestibule, the latter of the semicircular canals. Degeneration of the nerve will be found after the tenth day.

The prognosis and treatment depend upon the cause; besides this a blister of the mastoid process with quiet, rest, flushing the alimentary canal and a mild, unstimulating diet, are of benefit. Absorbents should be used early, followed in one or two weeks by full doses of strychnine. Galvanism is advised on the tenth day.

Disease of the auditory nerve causes tinnitus from irritation and deafness from destruction. The prognosis and treatment depend on the cause.



Disease of the glossopharyngeal nerve causes irritation of the pharynx and back of the tongue; destruction causing loss of sensation and taste on the posterior third of the tongue. Disease is usually of the centers.

Disease of the pneumogastric nerve causes many symptoms throughout its extensive distribution; from anesthesia of the external ear to paralysis of the pharynx, larynx, esophagus, stomach and heart. Neuritis of its branches explains many thoracic symptoms.

Irritation of the spinal accessory nerve causes torticollis. This is generally due to catching cold, and is most common in children. The ear on the affected side is drawn down toward the shoulder. It may last for years, paroxysmally, and cause deformity. It is sometimes relieved by nervous sedatives, such as gelseminine and cicutine hydrobromide, either of which may be pushed to full effect. Hygienic and psychic treatment is usually required. Excision of the nerve or its roots sometimes cures and sometimes fails. Contractures require apparatus.

Disease of the hypoglossal nerve generally causes paralysis of the muscles of the tongue. If the disease is central the paralysis is unilateral. Syphilis is the most common cause. The tongue protrudes towards the palsied side. Fibrillary contractions occur, and atrophy follows. The treatment depends upon the cause.

## NEURITIS

Inflammation of the nerves may be interstitial or parenchymatous, as it affects the connective tissue elements or the nerve structures. Acute neuritis causes pain and tenderness along the trunk of the nerve, with some fever, diminished reflex irritability and increased or diminished sensation. The symptoms moderate in a few days, but do not cease. The course extends from six weeks indefinitely. The reaction of degeneration may be manifested after the first week. The causes are various toxins developed in or out of the body, infectious or otherwise. The diagnosis from myalgia is made by the absence of tenderness on pressure in the latter, and the distinct limitation of the pain to the affected muscles, which may be elicited easily by inducing their contraction with a faradic current. From neuralgia the diagnosis is made by the presence of local inflammation along the trunk of the nerve; the increase of pain on pressure and the presence of fever. The prognosis is doubtful, depending upon the cause, the general health and the patient's tractability.

Subacute cases last longer, the original infection being slighter. The onset is gradual, the symptoms less severe, the prognosis more doubtful.

Chronic cases persist more than three months, generally following more acute forms. Muscular atrophy is a marked symptom, the local inflammation of the nerve trunk being obscure. Paralysis is more and the reflexes may be lost, although sometimes they are increased. The disease can hardly be confused with rheumatism, which is an inflammatory affection of the joints, shifting from one to the other, while neuritis is confined to one or more nerve trunks and never shifts, although new nerves may be involved. The latter is more common in low, damp, ill-ventilated localities. The prognosis is good if the patient submits early to intelligent treatment.

The part involved must be put absolutely at rest, splints or similar apparatus being often advisable. Cold or heat may be applied locally, or counter irritants applied over the affected nerve. Pain may best be controlled by the administration of hyoscyamine, hyoscine, gelseminine or cicutine hydrobromide; of either of these a full dose may be injected hypodermically as near as possible to the affected nerve. The absorbent combination should be employed here (mercury biniodide gr. 3-67, arsenic iodide gr. 1-67, iodoform and phytolaccin a gr. 1-2), as soon as the acuter symptoms have subsided under the use of gelseminine. If the pain is very acute in the early inflammatory stage moderate doses of aconitine may be added to the hypodermic. The practitioner who is familiar with the use of the remedies advised here will not make use of any form of opiate in treating neuritis. Absorption may be favored by massage, and the resumption of function by affected nerves hastened by the administration of strychnine and the use of galvanism. Hygienic measures are always necessary, and the diet of the debilitated patient should be made as nutritious as his digestion permits.

Multiple neuritis is generally due to alcohol. Early symptoms are toe and wrist-drop, pain along the nerve trunks in the legs and arms, loss of the knee-jerk, wasting of the muscles and early reaction of degeneration. The peculiar gait is early manifested, and ataxia may be simulated. The digestive disorders of alcoholism attend. Palpitation of the heart and disordered rhythm may be present or paralysis of the eye-muscles, optic atrophy and blindness. The nails are brittle and ridged transversely. Degeneration of the nerve protoplasm occasions muscular atrophy. Pain is not so marked as in non-alcoholic forms. There is a peculiar mental condition attending these cases, characterized by easy, good-natured acquiescence in anything which is proposed, unless it concerns the patient's use of alcohol. The prognosis is good if the patient submits to proper treatment. Malaria may cause intermittent paraplegia.



When multiple neuritis is due to lead poisoning, wrist-drop occurs early. The onset is rapid and preceded by gastrointestinal disturbances, colic, etc., while the blue line on the gums and other evidences of lead poisoning may be present. Carbon bisulphide causes neuritis with intense frontal headache, excitement, vertigo, muscular cramps and sometimes convulsions.

Multiple neuritis may also be caused by diphtheria. The history will clear up such cases. Arsenical neuritis may be caused by too long medication or by sleeping in a room with arsenical wall-paper. The head symptoms are absent.

The treatment depends upon the cause largely. When arsenic, lead or alcohol are causative, their use must be stopped and the poison in the body eliminated. Besides this, the treatment is to be conducted on general principles. The free use of water internally is advisable. It must be remembered that the regeneration of the nerve tissue is a slow process; but the degree to which this may be effected would only be admitted with difficulty by those whose views on disease are exclusively founded on post-mortem appearances.

## SCIATIC NEURITIS

This differs from neuralgia of the sciatic nerve by the evidences of local inflammation along the nerve. It is more common in men who are exposed to cold and wet, or are very hard workers, hence is found in miners, puddlers, stokers, and cabmen. Predisposing causes are the neurotic, rheumatic and gouty cachexias, lead-poisoning, diabetes, syphilis, typhoid fever, influenza and malaria. It may follow childbirth or pelvic operations. It occurs in shoemakers from compression of the nerve. It sometimes follows injury of the nerve or excessive fatigue of the legs, as induced by continued application to the sewing machine. Tumors and other local affections impinging on the nerve give rise to it.

The symptoms are pain and tenderness along the course of the nerve. In inveterate neuralgias this may be altogether induced by pinching of the nerve in the sacrosciatic foramen. The suffering may be excessive and constant, being worse at night, exercise increasing it. Lameness results, or lateral curvature of the spine. Painful points may develop over the trochanter, in the popliteal space, at the head of the fibula and the dorsum of the foot; also in the middle of the iliac crest, above the sacrum, over the patella, in the calf, behind the ankle or in the sole of the foot. Paroxysms of agonizing pain occur at some of these points, following exercise or catching cold. Patches of skin may be

anesthetic, cramps or tremor of the calf may be present, the knee-jerk may be increased or diminished, the heel-jerk absent. Fibrillary twitching accompanies atrophy and paralysis. Spasms may be excited by the slightest irritation. Vasomotor disturbance may cause flushing or lividity, and sometimes edema. The skin is dry or covered with sweat. Sometimes erythema, acne, herpes, scaliness or perforating ulcer of the foot may be present. Wasting of the muscles is shown by the reaction of degeneration. Sometimes the disease is bilateral.

The diagnosis from neuralgia is made by the evidences of local inflammation along the nerve. In myalgia the affected muscle can be picked out with the faradic current. In hip-disease there is tenderness in the joint, pain in the obturator nerves and the gluteal crease is effaced. Hysteria presents other symptoms of that malady. The diagnosis should always embrace an examination of the rectum and the pelvis in the search for causal lesions. The prognosis is good if uncomplicated; otherwise it depends upon the cause. The course will be shorter if the patient can be confined to his bed. Atrophied muscles require considerable time for reconstruction.

The treatment is that of local neuritis. Special points are the examination for rectal diseases and for pinching at the sacrosciatic foramen, whose enlargement in such cases we commend to the attention of the surgeon. Nerve stretching sometimes relieves the nerve of adhesions and proves beneficial. Massage with hot camphor liniment along the affected nerve is useful.

## NERVE TUMORS

Hypertrophy of the nerve trunks is rare; hyperplasia of the connective tissue somewhat more common. Neuromata are rarely found on the spinal nerves. They are usually quite small and few in number. More common are neuromata mixed with fibroma, myxoma, glioma, sarcoma, carcinoma and syphiloma. The causes are hereditary, dietetic or traumatic. There may be no symptoms, the most frequent being pain and tenderness, paresthesia, anesthesia, paralysis and reflex spasm. The diagnosis is made by physical examination. The treatment is surgical.

Any single nerve may be subject to disease or injury giving rise to new growths, division, degeneration or neuritis. Irritative symptoms are hyperesthesia, pain, spasm, tremor, contraction and hypertrophy. Destruction causes anesthesia, paralysis, dystrophy and atrophy. The symptoms differ as the nerve affected is sensory, motor or mixed.



Disease of the phrenic nerve causes intercostal pain, paralysis of the diaphragm with costal breathing, and extreme dyspnea.

The suprascapular nerve may be injured in shoulder dislocation, the spinatus groups wasting, with weakness and disability of the arm.

The long thoracic nerve is frequently injured by pressure, the chest expansion being affected and movement of the arm hindered. Paralysis of the serratus causes the scapulæ to project, wing-like. Affections of the circumflex nerve cause paralysis of the deltoid muscle with wasting and ankylosis. Paralysis of the intrascapular nerve causes wasting of the spinatus groups. When the musculospiral nerve is affected the extensors and supinators of the forearm are paralyzed. Affections of the ulnar nerve are shown in the flexors of the forearm and the small muscles of the hand, excepting those supplied by the median nerve, the radial flexors and the pronators. Frequently two or more of these nerves are affected simultaneously.

In neuritis of the brachial plexus we have pain and tenderness in the distribution of the affected branches, increased on motion of the shoulder. It is more common in women, after middle life, especially the gouty or rheumatic. The muscles are tender and waste, giving the reaction of degeneration. Reflexes are generally weakened. Permanent cure is unusual.

The most common affection of the nerves of the trunk is herpes zoster.

The nerves of the legs are less frequently affected than those of the arms with the exception of the sciatic. The external cutaneous branch of the anterior crural nerve is sometimes affected. The patient complains of burning frequently in the outer upper part of the thigh. This occurs in neurasthenic women with ovarian disease. When the anterior crural nerve is affected the knee-jerk is abolished, the quadriceps wastes and the skin is anesthetic from the drawing of the foot. Paralysis of the obturator nerve inhibits the abductors of the thigh, while affections of the superior gluteal nerve are shown in irritation or paralysis of the gluteal group. Paralysis of the calf muscles indicates an affection of the internal popliteal nerve.

Morton's metatarsalgia is due to neuritis caused by pressure of the heads of the metatarsal bones. Narrow shoes may account for it. There is sudden agonizing pain opposite the fourth toe and shooting up the leg. It may be relieved by firm pressure, as by a well-fitted shoe.

Rhizomelique spondylitis is an inflammatory affection of the spine, probably of nervous origin. It may cause almost as much deformity as humpback, although not angulated. The causes are conjectural;

heredity, cold, wet, traumatism and gonorrhea have been suggested. The symptoms are pain, increased by sleeping, limited motion, girdle pains, sometimes paraplegia with areas of hyperesthesia or anesthesia. Motion may induce severe pain. The vertebral cartilages are absorbed. Muscular spasm contributes to the deformity. The prognosis is bad, although sometimes treatment stops the progress of the disease. As in the vast majority of nervous diseases, it is dawning upon the medical profession that fecal autotoxemia is a potent factor in the causation, and the removal of this as a possibility is one of the cardinal elements in their treatment.

## ACUTE ASCENDING PARALYSIS

### LANDRY'S PARALYSIS.

An acute disease characterized by an ascending paralysis, beginning in the legs and extending upwards, involving the muscles of the upper limbs and trunk, often affecting the muscles of the face, tongue, palate, larynx or eyeballs. The disease is of short duration, death usually resulting from respiratory paralysis.

But little is positively known regarding the pathology. By some observers the disease is believed to be really an acute myelitis or an acute polyneuritis. The prodromal stage suggests an acute infectious disease, inasmuch as there is fever, splenic and lymphatic enlargement, and occasionally albuminuria. Softening and extravation of blood into the gray substance have been observed.

It is not known what is the chief cause of the disease. It has followed influenza, the infectious fevers, traumatism and exposure to cold. It occurs most frequently in males and between the ages of twenty and fifty years. Alcohol and syphilis do not seem to be exciting factors. Pearce attributes it to autotoxemia.

The period of invasion is usually quite abrupt. More frequently the prodromal symptoms exist but a few hours, although in some cases premonitory symptoms have been noticed for several days or even weeks. These symptoms are usually sensory in character and consist of tingling, formication, numbness and dull aching or shooting pains. There also may be gastralgia or diarrhea. The patient is restless and fidgety, with stiffness of muscles, chilly sensations, some elevation of temperature, a feeling of heaviness and languor, malaise and loss of appetite. Sometimes the extremities are cold with clammy sweating of the soles and palms. The spleen is always enlarged. In the period of paralysis the sensory symptoms may persist, although in the majority of cases they



are not pronounced. Marked anesthesia has been observed in some cases, painful impressions being more impaired than tactile. There is marked weakness followed by paralysis of the lower extremities, one leg being affected a few hours before the other. The paralysis quickly ascends, involving first the muscles of the trunk, principally those of the abdomen and back, then the arms. In almost all cases the paralysis is flaccid, there being no muscular resistance when the extremities are passively moved. Usually, but not always, the electrical excitability remains normal. The reflexes disappear. The bladder and rectum are not affected in the majority of cases, neither do bed-sores develop. There are no cerebral symptoms. Death usually results from bulbar involvement resulting in cardiac or respiratory failure or inability to swallow. Very rarely the disease shows a descending instead of an ascending course.

Death may take place in from two or three weeks to several days. There have been a few cases of recovery reported. The improvement, if any, takes place in the reverse order to the onset, the part last affected being the first to show signs of recovery, but the improvement is much slower than the invasion.

**Diagnosis:**—The acuteness of the attack, the ascending paralysis, the prodromal symptoms, the absence of electrical excitability and the slight sensory symptoms usually enable one to easily make a diagnosis.

Acute myelitis is more often mistaken for Landry's disease, but in this disease the paralysis does not begin in the lower extremities and extend to the trunk and upper limbs but is sudden and complete. Bed-sores are common and wasting is marked, while there are no trophic changes in acute ascending paralysis. Moreover there are early involvement of the sphincters, reaction of degeneration and sometimes girdle pains, which are never present in Landry's disease.

Prognosis is always unfavorable, and more so if bulbar symptoms occur.

**Treatment:**—But little can be done. Massage, baths and electricity are of value, especially to hasten convalescence when the symptoms have been arrested. Absolute rest and entire freedom from worry and excitement are essential. Free elimination by the bowels, skin and kidneys, and respiratory and cardiac stimulants are indicated. Digitalin, strychnine, atropine, ergot and the iodides have been recommended.

The writer has had two cases in women in which the malady was attributed to residence in the elevated regions of the Rocky mountains. One case was not improved by removal to Chicago; in the other the progress of the disease was arrested. Intestinal antiseptics were here employed.

## II. DISEASES OF THE SPINAL CORD AND MEMBRANES

### EXTERNAL PACHYMEMINGITIS

External pachymeningitis may occur acutely with caries, tumors, aneurisms or syphilis. Abscesses may penetrate to the cord or inflammation occur in persons long confined to their bed. The symptoms are those of myelitis from compression. The chronic form is usually caused by vertebral tuberculosis. The internal surface of the dura is smooth, the external roughened by cheesy deposits.

Internal pachymeningitis is generally found in the neck. The space between the cord and dura is filled with interlacing fibers, the cord compressed, the central canal dilated and the nerve substance degenerated. The nerve roots are involved. The first period is painful, the second paralytic, the third spastic. The symptoms are intense pain along the nerve whose roots are involved, with hyper- or anesthesia and atrophy of the muscles of the hand. The arms are weak, especially the flexors, so that the emaciated hand becomes claw-like. The lower limbs may be involved some months later, with spastic paralysis from secondary degeneration. The bladder may then be paralyzed and bed-sores form. The disease lasts two years or more. Recovery sometimes takes place.

The diagnosis is made by the presence of the symptoms stated, with the history of the causal malady. The prognosis is doubtful. The most acute cases end fatally, and recovery may be imperfect and followed by relapse.

### LEPTOMENINGITIS

This condition is closely allied to the preceding. Clinically we find the two usually together. This, however, is likely to be very diffuse, it being generally due to sepsis. Serious symptoms, therefore, follow slight inflammation. The attack is fulminating, with less pain but more paralysis. It is generally acute. The back is fixed, head retracted, spine tender, muscular tremor and spasm present, followed by palsy. The prognosis is uncertain, depending upon the virulence of the infection and the extent of the disease. Diagnosis may be aided by lumbar puncture. Marked paraplegia occurring early is unfavorable. The hypertrophic form is sometimes caused by the gonococcus.



The treatment consists in absolute rest in bed, in a quiet dark room with ice to the spine if the symptoms are acute; if not, silver nitrate should be applied. The actual cautery is even more promptly efficacious. Fever should be met by veratrine, and the absorbent remedies brought promptly and decisively into operation at an early date. Inunctions of colloid silver have been employed with benefit. Persistent convulsions call for solanine, with special care directed to the eliminants. Massage and systematic movements are of value later.

### CAISSON DISEASE

Exposure for long periods in compartments containing compressed air gives rise to this affection if the pressure exceeds three atmospheres. The symptoms are paraplegia and sometimes general paresis, developing when the individual suddenly returns to the ordinary atmospheric pressure; immediately or several hours afterwards. Pains are felt in the knees, sometimes quite severe, also in the abdomen, with vomiting. The muscles are tender, the gait spastic, with dizziness, intense headache, in severer forms complete motor and sensory paraplegia. Extreme attacks resemble apoplexy, with profound coma and death within a few hours. In ordinary cases the paralysis may subside in a day or continue for months. The disease is thought due to vasomotor disturbance. Hemorrhages have been found in the substance of the spinal cord. The patient should be kept quiet, pain controlled by the usual remedies, and the paralysis treated like that due to any other cause. The disease does not appear if the workman spends at least five minutes in compartments each an atmosphere higher than the preceding. The same precaution should be taken when coming out. Ergot has been advised to control the vasomotor nerves, given in full doses.

### SPINA BIFIDA

Imperfection in the development of the vertebræ permits a hernia of the spinal membranes. In France one child in 1200 is thus affected. Other developmental defects may attend. Heredity may have some influence. It is more common in boys. The spinal membranes alone may protrude, or the cord as well, while in syringomyelocoele the fluid occupies the central spinal canal. The latter is a rare form. The walls of the protrusion are lined with the dura and arachnoid. If the nerves and cord protrude they form part of the posterior and median walls. Fat and connective tissue are also present in the tumor. The protu-

sion is usually in the lumbar and sacral regions, involving two or more vertebrae. The skin over it may be glossy, tough, thick or ulcerated. The children are poorly nourished, feeble, with weak mentality. Paraplegia attends one-half the cases, sometimes with anesthesia and sphincter involvement. Contractures also occur. The prognosis is grave, these patients being very liable to injury, infection and secondary myelitis. The diagnosis is unmistakable. If the cord and nerves are protruded, the paretic symptoms are marked and there is a depression marking the nerves' attachment. The most successful treatment as yet devised is the injection of Morton's fluid, which consists of iodine gr. 10, potassium iodide gr. 30, glycerin 1 ounce; one dram of this is injected on the outer portion of the sac, the child being kept on its back. The operation should not be done until the child is four months old.

### PRIMARY LATERAL SCLEROSIS

In this disease muscular paralysis begins in the legs, with increased reflexes but without atrophy or sensory disturbance. It is most frequent between twenty and forty years. Alcoholism and syphilis, hereditary or acquired, traumatism, exposure to cold and wet, infectious maladies and excesses inducing debility, especially of the nervous system, are considered the causes. The first symptom is rigidity, with weakness of the leg muscles, dull pains or a sense of fatigue. One leg may be affected sooner or worse than the other. The weakness is gradual and not in proportion to the difficulty in walking, which is here due to rigidity. This lessens if motion is persistent. The leg extensors may contract with spasmodic rapidity; the adductors also become spastic—cross-leg gait. The patient trips over slight objects or wears out the toes of his shoes. The feet are raised with difficulty and soon are simply pushed over the floor. Voluntary effort increases the spasm of the muscles. The knees are kept close together and the feet may cross in walking. The deep reflexes are increased, the superficial ones slightly. The muscles feel firm and are only wasted through disuse. The sphincters are only involved quite late. Paresthesia may be present. The arms are only involved late. Trophic ulcers are rare, but the affected members are readily frost-bitten.

The disease may last many years. It consists in a degeneration of the pyramids; whether primary or secondary is uncertain. From transverse myelitis it is distinguished by the absence of sensory symptoms; the chronic course and the late affection of the sphincter. In ataxia the muscles are less spastic, the sphincters are involved and



incoördination is marked. In amyotrophic lateral sclerosis there is muscular atrophy. The prognosis is steadily progressive to the bad although death may not be hastened. The older treatment is not encouraging, silver, gold and iodine having been administered without any distinct indication or special results.

### SPASTIC PARAPLEGIA

This may be due to chronic myelitis and also accompanies a congenital lateral sclerosis. It may be hereditary. The symptoms appear soon after birth or in hereditary cases up to maturity. It may be confined to the legs. It is distinguished from cerebral paralysis by the lack of mental involvement. Sometimes the limbs cross in walking. The arms are less affected; the muscles of the face and neck may be slightly involved. There is no pain. Sometimes the progress is quite rapid until the patient becomes helpless from contractures; epilepsy or mental degeneration may develop at puberty. Mild cases may improve under treatment but severe ones rarely reach youth. The treatment consists in massage and systematic training of the affected muscles with the treatment recommended in general for nerve degeneration.

### FRIEDREICH'S ATAXIA

This occurs in early youth, generally in males, the patient having previously been in good health but susceptible to nervous maladies. It may be hereditary although never congenital, syphilis and alcohol being the progenitors. The symptoms consist in ataxia, with choreic motions, sometimes athetosis, the speech punctate and drawling, with dribbling of saliva, difficulty in mastication and swallowing. The mind is better than is at first apparent. The Argyll-Robertson pupil is not constant, but nystagmus is common, generally bilateral. Romberg's symptom is common. The knee-jerks are usually absent, changing from year to year. Sensory symptoms are absent. The sphincters are not affected. Club-foot may occur and local muscular atrophies with fibrillary twitchings. The spine may curve from the loss of muscular support.

The disease consists in a hyperplasia of the connective tissue, especially in the posterior roots and columns of the cord, with round-cell infiltration in other parts and isolated areas. The patient usually dies before reaching maturity. The treatment is symptomatic and palliative.

Cerebellar ataxia is also hereditary, becoming manifest at or after the fifteenth year. In it we have ataxia, the cerebellar gait, the knee-

jerks variously altered, rarely ankle-clonus. It may endure for ten years, contractions causing club-foot. The lesion is a degeneration of Purkinje's cells in the cerebellum and posterior columns of the cord. Optic atrophy and nystagmus may be present.

## SPINAL MALADIES

Acute hyperemia may be caused by violent exertion, sexual excess, amenorrhea, and by some poisons such as strychnine. The chronic form rarely follows meningitis or injury. The symptoms are a sense of weight around the loins, twitching muscles, formication, neuralgic pain and anesthesia of the legs. The sphincters may be involved. The affection is of problematic existence. It could only be recognized during life, and opportunities for such observation of the cord under normal conditions are obviously rare; while it must be exceedingly difficult for the circulation of the cord and membranes to be disturbed. If the disease is recognized the treatment consists in the application of cold or counterirritation over the spine, with sedatives such as gelseminine, opium, and especially solanine internally.

Even less is known of spinal anemia, but it may be caused by a severe hemorrhage or diarrhea, or by any local obstruction to the supply of blood. Serious disturbance of the cord may result from disease of its arteries, or sclerosis may follow pernicious anemia. The descriptions in the older books of practice are imaginary.

Spinal hemorrhage is more common in men and in new-born infants, the cause being traumatism or the convulsions of epilepsy, tetanus, chorea, eclampsia and strychnine. It may occur in purpura and similar affections, or from the rupture of an aneurism. Very small hemorrhages may cause no symptoms. In large ones there is severe pain in the back, shooting down the limbs, with numbness and hyperesthesia, spasm of the back and other muscles, followed by paralysis and abdominal disorders. The acme is reached in a few hours, when death may occur from exhaustion, or slow recovery, or chronic inflammation. The diagnosis is made by the above symptoms and the history. If the patient survives the fifth day he has a chance for recovery. Enjoin absolute rest in bed, empty the bowels and keep them clear, apply leeches or cups over the lesion and keep the patient comfortable with sedatives. In a few days the absorbents may be employed, with silver nitrate over the affected portion of the spine.

Hemorrhage sometimes occurs in the substance of the spinal cord, from purpura or similar diseases, in myelitis, or in consequence of



tumors. It may occur primarily in infancy or in young men, from traumas, convulsions, exposure, overexertion, syphilis or sexual excess. In the aged it sometimes occurs with arteriosclerosis, forming a true spinal apoplexy. The symptoms follow the effusion rapidly, as numbness or weakness, followed in a few hours by sudden paraplegia or ataxia, or both. The senses of pain, heat and cold may be lost, while that of touch is retained. Retention of urine is usual. The reflexes may disappear, returning in exaggerated form. Pain in the back is severe. If the lesion is high enough up, the anus or even the thorax may be involved. Within two weeks the symptoms subside into those of chronic myelitis, or death will occur from acute inflammation. The vessels are first degenerated. Rupture is most frequent in the central cord. The hemorrhage is generally single but not always. The diagnosis is made by the sudden onset, without premonition, and the absence of fever. The pain is less than in meningeal hemorrhage. The dissociation of sensation is characteristic. The prognosis is good as to life, doubtful as to recovery, depending on the extent and seat of the hemorrhage. The treatment is cold to the spine, emptying the bowels by exosmotic enemas, and the use of cardiac depressants like aconitine. Beyond this it is strictly symptomatic.

## SYRINGOMYELIA

Dilatation of the spinal cord may occur in two forms—hydromyelia, dilatation of the central canal, or as a cavity in the gray matter from softening of a glioma. The latter is hereditary. There may be one or many cavities, separate or connected, in one or both halves of the cord. The most common site is the cervicodorsal part. The malady may follow acute infections which arouse the hereditary tendency.

As various areas of the cord are affected by the disease the symptoms resemble those of ataxia, lateral sclerosis, spinal muscular atrophy, etc. In cases of irregular atypic spinal cord disease syringomyelia is always a possibility, especially if there is a hereditary tendency to it. The special characteristic is dissociation of the sensory phenomena, such as loss of pain and temperature sense in irregular areas, with retention of tactile and muscle sense. When one side is affected we may have Brown-Sequard paralysis, with the above described dissociation, or anesthesia, or absence of all sensations. If the affection is high enough up the cord to involve the fifth nerve's ascending branch the face will be anesthetic. Involvement of the cervical sympathetic causes contraction of the pupil on the affected side, sometimes with absence

of sweating. If the centers controlling the spinal muscles are destroyed we will have lordosis or scoliosis. The motor cells may be affected, with muscular atrophy and curvatures of the spine. The reflexes are destroyed as the disease penetrates more deeply. Atrophy of the legs may ensue, and the reaction of degeneration be elicited from the affected muscles. The course of the disease is slow and it may pause for a time. Death may be due to extension to the centers of the heart and lungs. No special treatment has been evolved.

## ACUTE ANTERIOR POLIOMYELITIS

This malady attacks children, and is probably of microbic causation. The attack is sudden, with a chill followed by fever of 104 or more, nausea, vomiting restlessness and hyperesthesia of the extremities. The fever abates within two days, leaving the child weak and with paralysis of one or more limbs, which waste rapidly and afford the reaction of degeneration during the second week. The anterior tibial group is more frequently affected, next coming the calf, femoral extensors and adductors. The arms are not often affected alone. The deep reflexes are abolished, the limb cold, clammy, cyanosed and wasted. Contractures and other deformities follow. Extension is unusual. The affected member does not grow with the rest of the body. The sphincters are never involved, nor is decubitus often present. The paralysis at first rapidly improves and then promptly develops. The malady may be epidemic in spring and summer.

It is an acute inflammation of the multipolar cells in the anterior gray horns, especially in the dorsolumbar region. These cells degenerate, the connective is hyperplastic, and the nerves springing from the affected section participate in the degeneration.

The malady is more sudden in onset than neuritis, the paralysis more decided, with no tenderness of the nerve trunks. Diagnosis is to be made from hip-joint disease, rickets, muscular dystrophies and cerebral paralyses.

As an acute infection, the treatment should be that of such maladies—cleaning out the bowel, disinfecting it, subduing fever, and promptly saturating with the sulphides, reinforcing the leucocytes, etc. When the fever subsides the debris is to be promptly removed by absorption stimulation, and the nutrition, general and local, at once enhanced. As wasting is so prominent the local use of hot cod-liver oil inunctions is advisable. The nutrition of the affected tissues may be enhanced by the use of neuro-lecithin.



Systematic exercises may aid in developing the affected limb. Pearce advises placing the child in a warm bath and there exercising, as the water sustains the limb and allows less fatigue from movement.

## BULBAR OR GLOSSO-LABIO-PHARYNGEAL PARALYSIS

The symptoms are due to disease affecting the medullary centers of the 5th, 7th, 9th, 10th, 11th, and 12th cranial nerves. Other nervous maladies may also be present. In the acute form we see a sudden onset, dribbling of saliva, motor difficulty of speech and atrophy of the tongue. The attack may resemble apoplexy. The malady progresses rapidly, swallowing grows difficult, wasting ensues, choking occurs with solids or even with liquids, the speech is drawling, consonant pronunciation being first affected. The mental faculties are unaffected. Writing is perfect.

The course is rapid, and in a few months death occurs from pneumonia, choking, or involvement of the vagus centers. In all forms the symptoms are bilateral, the tongue first affected.

The chronic type presents similar symptoms but they are developed slowly, and the general health does not suffer so much. While the acute form is based on inflammation, softening or minute hemorrhages in the bulb, with bilateral symptoms, in the chronic there is atrophy of the motor neurons, and one side is more involved. This may last up to 18 months, or several years, with irregular heart-action and attacks of tachycardia. The disease is progressive and no treatment has as yet succeeded in more than apparently delaying it. The stomach tube may be required to feed the patient. Strychnine in full doses has proved beneficial, and possibly among the other members of the strychnine group may be found more effective remedies. Galvanism of the affected muscles is useful.

The asthenic form occurs later in life, about the 40th year, more in women than men. Pearce attributes it to an autointoxication, from defective metabolism. The motor cranial nerves are affected, the central impulses wanting. The above described symptoms are presented, with remissions recurring regularly. The course is more prolonged. Possibly the prevention of toxemia may give better results—the fact of a remission does not allow the hypothesis of a destructive lesion.

In pseudobulbar paralysis we have a progressive failure of these muscles without atrophy or general weakness. It is attributed to cerebral lesions.

## COMBINED SCLEROSES

Many variations have been described, as various portions of the cord are involved simultaneously. The Putnam-Lichtheim-Dana type occurs in elderly persons, with some cachexia, such as pernicious anemia, malaria, lead poisoning, chronic diarrhea or influenza. Heredity may also often be established. The first symptoms are persistent paresthesia, slight weakness, especially of the feet, followed by ataxia. There may be pain in the limbs and back. At first there is spasticity of muscles, increased knee-jerks and ankle clonus, rigidity subsiding later and both reflexes lost. Romberg's symptom is usually present. The arms are similarly affected some months later. Sometimes the malady commences in them. The tactile senses may be weakened or dissociated. Dementia may develop. The malady attacks the posterior columns first and most severely. The lateral columns are generally affected also, the anterior later. The cord may soften and cavities form.

Diagnosis is to be made from ataxia, posterior lateral sclerosis, syringomyelia, etc. The patients survive from six months to some years, and some improve greatly. There is no special treatment.

## MYELITIS

Inflammation of the spinal cord commences insidiously, sometimes abruptly. The course may be mild, severe or fulminant. The causes are exposure to cold and wet, traumatism or sepsis. It is most common in men. A low inflammation with round-cell infiltration, more in the gray matter, resulting in granular debris and fatty degeneration of the cells with connective hyperplasia. Myelitis may be transverse, ascending or descending.

The onset is sudden, with a little fever, paresthesia and weakness of the legs, rapidly increasing until the patient is confined to bed, with incontinence of urine and feces. The arms are involved only if the malady extends above its usual seat in the lumbar cord. The reflexes are first increased and ankle clonus may develop, the gait spastic and becoming ataxic, as the posterior white columns become involved.

Atrophy of the muscles follows involvement of the multipolar cells. In acute cases the irritative symptoms will soon give place to anesthesia of both legs, or up to the navel. Retention of urine and cystitis then appear. Bedsores form, the reflexes are abolished, wasting occurs, with hectic or septicemia which may be fatal. Or, partial recovery may follow after a long course, or as in traumatic cases, the cord remain

permanently impaired. When almost complete recovery follows an acute attack the meninges have probably been the seat of the malady. The legs are cold, clammy, cyanosed and low in vitality.

The diagnosis is from neuritis, subacute rheumatism and spinal syphilis. Prognosis should be guarded.

The treatment consists in absolute rest in bed, the defervescence of fever, precautions against bedsores, analgesic alkaloids for pain, attention to the bladder to prevent retention, and the early vigorous use of absorbents. The muscles should be exercised by faradism and massage to prevent wasting. Too early activity is perilous.

## MULTIPLE SCLEROSIS

We find in this chronic malady small areas of sclerosis disseminated through the brain and spinal cord, one or both, especially in the white matter. The causes assigned are injury of the spine, exposure to cold and wet, with toxemia, overwork, emotion, perverted secretions and excretions, infectious diseases and metallic poisons. This is purely conjectural—the etiology has never been absolutely demonstrated.

The symptom picture varies with the location of the lesions. The limbs are weak, becoming spastic, the deep reflexes exaggerated, coarse tremors develop in the affected parts, of the intention type, awaked or exaggerated by volition, invading arms, legs and later the head. Tremor subsides when the part is at rest, certainly during sleep. It may be so coarse as to resemble ataxia. Nystagmus is common, persistent, usually lateral, possibly developed only by strain. Paralysis of ocular muscles, optic atrophy and sometimes Argyll-Robertson pupil occur. The lower cranial nerves may be involved. The speech may be slow, scanning, resembling that of bulbar palsy or Friedreich's ataxia, or of parietic dementia. Vertigo and seizures like apoplexy or epilepsy may occur, or anesthesia in patches or of half the body be found. Paresthesia is common. The diagnosis is easy. The course may be interrupted by remissions. Cerebrospinal syphilis does not often show intention tremor, nystagmus and scanning, and the pupils are affected frequently. Tremor of paralysis agitans occurs when at rest and may be stopped at will. Parkinson's disease occurs in the aged and has no nystagmus or scanning. Infantile cerebral palsies appear earlier, with convulsions and arrest of mental development. Scanning, nystagmus and ataxic movements may be present in the diplegic form but not all three in the same case, while marked paralysis and contractures occur. In Friedreich's ataxia we see heredity, optic atrophy, reflexes diminished, and leg ataxia; in cerebellar



forms Romberg's sign. The malady is slow but incurable. The remissions have not been shown to be due to treatment or not due to it. No special treatment has been established.

### LOCOMOTOR ATAXIA

This is a disease of the posterior columns of the spinal cord, characterized by progressive changes, incoördination, sharp lancinating pains, absence of patellar reflex, and the Argyll-Robertson pupil.

**Pathology:**—The cord is smaller and thinner, the posterior roots smaller and pia mater thickened, adherent, opaque or slightly congested. The degeneration of the posterior and middle portions of the posterior columns is more pronounced in the lower lumbar and dorsal regions, primarily in the tract of Lissauer. The sclerosis extends as the disease progresses so that in advanced cases the fasciculus of Gall is involved. There are changes in the peripheral sensory, sometimes in other sensory nerves, the cerebrum, optic nerves and cerebellum. Occasionally atrophy and absorption of the articular surfaces of the bones is found.

**Etiology:**—The disease is more common to the white races, not often seen among the colored races, even less frequently among Jews. Males are more liable, most frequently in middle life.

Many believe that syphilis is the chief cause. It is claimed that the history of syphilis is found in 90 per cent of the cases; but syphilis is extremely common, and, is more often found among races least susceptible to ataxia.

Tabes is not pathologically identical with syphilis, it is not pathologically a gummatous disease of the cord and brain, such as could be removed by antisyphilitic treatment; indeed, such treatment has but little if any value in this disease.

In all probability syphilis is a predisposing factor, acting, possibly, similarly to that of the elaborated toxin of diphtheria, or certain drugs having a selective action on certain cells and tissues. Such drugs as ergot or lathyrus have a selective action on certain portions of the spinal cord, the symptoms of chronic ergotism often being precisely like those of tabes; the cord also undergoes a degeneration analogous to that of tabes. Syphilis has no selective action on any particular part. The disease may, however, and probably does lay the foundation in many cases for locomotor ataxia, by either a specific toxemia affecting the cord, or by so lowering the vitality of the patient that the cells of a certain portion of the spinal cord undergo degeneration because of their peculiar susceptibility to sclerosis in certain individuals.

Heredity may have some influence; various nervous diseases are often found in the family history of the patient. Autotoxemia, and the toxemias resulting from infectious diseases, may produce the disease. Autotoxemia is a much more frequent cause of the various scleroses than is generally believed (G. F. Butler). Other determining causes are exposure to cold, over-exertion especially when combined with exposure and privation; traumatism, especially an injury to the spine such as a shock, blow, or fall; alcoholism, and sexual excess. It is doubtful if alcoholism and sexual excess are often, or even rarely the cause of tabes. So far as the latter factor is concerned it must be remembered that abnormal sexual excitement with excessive indulgence are among the early symptoms of the disease.

**Symptoms:**—The disease may be divided into several stages—usually three, although the clinical course is extremely varied in intensity, duration and order of the occurrence of symptoms.

In the first or preataxic stage the patient complains of pains usually in the legs. At first they are very slight and may not increase in frequency or intensity for some years, but after a while the pains occur more often and are more severe, increasing as the disease progresses, and described as "lightning pains"—sharp, shooting, stabbing or boring, sudden in onset and of momentary duration. They may be paroxysmal and periodic, with longer or shorter intervals of ease, and are generally aggravated by damp or cold winds.

While the early pains are usually confined to the legs, they occasionally begin in the face or head. Like neuralgia, again, the pains are sometimes succeeded by a temporary cutaneous hyperesthesia.

The pupils do not contract to light suddenly thrown upon the eye, but contract normally when the patient attempts to fix a near object. This phenomenon is known as reflex iridoplegia, or as the "Argyll-Robertson pupil." Occasionally, and rarely, there are variations of this phenomenon; thus the pupil may contract to light and then dilate though the illumination be still present. Then again, the pupils may neither react to light nor to accommodation. The pupils are commonly contracted even to "pin point," and symmetrical in size and action, though inequality in the size of the pupils is not infrequently found. Unilocular iridoplegia, however, is very rare.

There may be slight incoördination of movement noticed, if at all, at night or in the dark, though ataxia does not usually appear until later in the disease. There is diminution or absence of the patellar reflexes (Westphal's sign). The knee-jerk in the early stages is occasionally exaggerated, but as a rule it is gone when the patient first comes under

the physician's observation. In this stage the patient sometimes complains of severe concentrated pain in the stomach, accompanied often by vomiting—"gastric crises". There is difficulty of micturition and markedly increased or impaired sexual power.

The second or ataxic stage is characterized by incoördination of movement giving rise to the ataxic gait. It begins by an unsteadiness in walking, more noticeable when the patient rises to walk, or when he turns suddenly, or when he is made to hop backward on one leg, walk backwards, or walk a given line, and when he attempts to walk up and down stairs. As the ataxia increases the legs are kept far apart, the feet lifted unnecessarily high from the ground and brought down with a stamping motion. The feet often get crossed in attempting to turn around. The patient bends forward at the hips and looks at his feet. He is unable to rise from his seat quickly and often requires assistance to start. Even when sitting he cannot thoroughly control the movements of his legs, which can be demonstrated by his attempt to touch one knee with the opposite heel or describe a circle with his toe. The patient will sway and stagger if he attempts to stand erect with his feet together and his eyes closed (Romberg's symptom). The incoördination gradually extends to the upper extremities so that he is unable to rapidly touch the tip of the nose with the forefinger, or to spread his arms apart and bring the forefingers rapidly together. He has difficulty in buttoning his clothes, in writing, or in picking up small objects. This maldirection of movement is increased when the patient's eyes are closed.

The reflexes are now completely abolished. The muscles begin to atrophy in many cases and there is more difficulty in urination, often associated with incontinence. By this time there are various disturbances of sensation. Gastric crises, already referred to, are common now. Other crises involving the larynx, liver, kidneys, urethra, clitoris, or intestines, may occur. Laryngeal crises are characterized by paroxysmal cough and dyspnea, and may be accompanied by coma or convulsions.

Hyperesthesia, analgesia and paresthesia are present. There is often complete loss of sensation in the testicles and breasts, and in the ulnar nerve (Biernacki's symptom). The girdle pain, or feeling of constriction as if a cord were drawn about some part of the trunk, is common to this stage. There is often analgesia, the patient being insensible to the prick of a pin, or the sensation of pain being delayed.

The third or paralytic stage is simply an aggravation of the symptoms of the preceding stage, and ushers in "the beginning of the end." The patient now finds it impossible to walk at all, or can only do so by invoking the support of two canes or crutches, or the assistance of friends. All



control over the bladder is lost; cystitis, muscular wasting and bed-sores may supervene. The patient becomes irritable, despondent and even demented. He grows steadily weaker and more emaciated, and death relieves him as the result of exhaustion, or he may succumb to infection resulting from catheterization, pneumonia, or other intercurrent disease.

There are certain circulatory symptoms and trophic lesions often accompanying tabes that have not been mentioned, such as rapid pulse, pseudoangina, aortic disease, and symptoms simulating Graves' disease.

Among early symptoms generally present are various ocular pareses, the patient displaying ptosis, diplopia, light nyctalopia, and contraction of the field of vision, which may be progressive and end in complete extinction of sight. The pareses may increase later or disappear.

Certain peculiar formations appear at the joints. The large joints, the knee especially, are more frequently involved, although any joint may suffer. The bones become fragile in many cases of tabes, and the long bones especially are liable to fracture. Perforating ulcer of the foot is not uncommon. Deformity and loss of nails are common, as well as herpes and purpura.

**Diagnosis:**—A well-established case of ordinary tabes is easily recognized, and often before ataxia is manifest a diagnosis can be made. The disease may be mistaken for peripheral neuritis. The latter-named disease can usually be traced to some immediate cause, such as alcohol, lead or arsenic poisoning, diphtheria, some infectious fever, or diabetes or other constitutional disease. Neuritis progresses rapidly and may quickly spread to the upper extremities, and the ataxic stage occurs, if at all, usually within a few weeks or months. There is more tenderness in the muscles, more tendency to herpetic eruptions, greater motor weakness and wasting, paresthesia, more pronounced pain, but not fulgurant in type, knee-jerk increased, absence of Argyll-Robertson pupil.

Alcoholic and arsenical poisoning resemble tabes more than the symptoms of peripheral neuritis just described. In these cases there is more often knee-jerk, sharp pains more nearly resembling those of locomotor ataxia, incoördination, but less pronounced than the tabes. The gait is entirely different from that of tabes, being what is termed high "steppage" gait. Visceral and trophic disturbances are not nearly so common in peripheral neuritis as in tabes.

The diagnosis from general paralysis, especially the spinal type, is attended with great difficulty, as the patient is ataxic, and there is loss of knee-jerk, the Argyll-Robertson pupil and many other symptoms similar to those of tabes. The progress of the disease, however, is more rapid than that of locomotor ataxia, and there are usually charac-

teristic signs of mental degeneration, such as loss of memory, irritable temper, incapacity for business, and hebetude. There is also hesitancy of speech and tremulousness of tongue, lips or hands. In general paralysis of the insane there are not present the lightning pains characteristic of locomotor ataxia.

In ataxic paraplegia there is a staggering, tipsy gait, but not like the gait of tabes. The knee-jerk is exaggerated, ankle clonus develops, but lightning pains are very rare. The pupils are normal, and nystagmus is common to ataxic paraplegia but rarely found in tabes.

In syringomyelia the lower limbs are usually paraplegic although they sometimes may be ataxic. The disease differs from tabes in that the limbs and upper part of the body are first affected, and there is a difference in the sensory disturbances, the temperature sense being first abolished.

Hysteria may occasionally be mistaken for locomotor ataxia. Usually, however the knee-jerk is present and the pupils react to light. In rare instances, however, these signs are absent, when the diagnosis is more difficult.

**Prognosis:**—The prognosis is very unfavorable, although the duration of life is not always by any means shortened. Death may occur from intercurrent disease. The prospect of retarding the progress of the disease is better the earlier the disease is treated. The prognosis is not influenced one way or the other by the fact that the patient has had syphilis.

**Treatment:**—Electricity has been employed and apparently with benefit in some cases. Static electricity and faradism applied by means of the wire brush have proved of benefit in relieving pain and restoring sensation to anesthetic areas. The constant galvanic current gradually increased to as many milliamperes as can be borne, one electrode placed over the sacrum, the other higher up on the spine, moved slowly up and down, tends to favorably modify nutrition. Electricity applied to the affected nerves in the ordinary ways sometimes relieves the various paralyses often occurring during the course of the disease.

Hydrotherapy when properly employed exerts a favorable influence in some cases. No extremes of heat or cold should be used, but tepid baths (80 to 90 degrees) in carbonated saline water, accompanied by gentle friction of the body, are often very beneficial.

Certain exercises designed to train the muscles in coördinated movements, markedly improve the ataxia in the majority of cases.

The rest cure should be tried at the beginning of treatment, especially if there is much pain. The "lymph cure" and testicular juice have

been highly recommended, and have produced remarkably beneficial results in many instances.

Drug treatment is indispensable, and much can be done to retard the progress of the disease and ameliorate the symptoms by proper remedies. The general treatment of neural maladies is to be employed but some special measures have proved useful in tabes. The writer has had one cure result from the persistent use of strychnine pushed to full effect and sustained there, for prolonged periods—in fact the patient formed the strychnine habit and had taken the drug to the production of muscular tonicity for over two years when last seen by the writer. Arbutin, one to five grains a day, protects against cystitis. Heroin sometimes relieves the lightning pains quickly, but better remedies are to be found in solanine, cicutine and hyoscine, which do not conduce to habitual drugging. Silver oxide cured one case.

### III. DISEASES OF THE BRAIN AND MENINGES

#### MENINGITIS

Inflammation of the dura mater is known as pachymeningitis, that of the pia mater as leptomeningitis. Either may be acute or chronic, simple or infectious.

Acute cerebral pachymeningitis may be primary when due to exposure to cold or heat, or secondary when caused by an infection, such as that from pneumonia, typhoid fever, cerebrospinal fever, or following injury, caries, syphilis or erysipelas.

The attack begins with a chill, followed by fever running beyond 105°; convulsions quickly supervene, tonic or clonic, with delirium, mania, violent vomiting and retraction of the head. The convulsions may begin in one set of muscles and spread. Paralysis is a late symptom. The pupils are dilated irregularly, and optic neuritis occurs. Strabismus may appear, diplopia or hemianopsia, and choked disk. The other special senses are hyperacute at first, the hearing gradually becoming dull. Spasm of facial muscles may be followed by paralysis. Involvement of the basilar membranes causes bulbar symptoms. The duration is variable. Later, stupor, paralysis and convulsions indicate compression. The acute stage lasts a week or ten days, sometimes ending by crisis, more frequently by lysis, with tedious and imperfect convalescence. Death may follow early severe symptoms. The prognosis is worse in children. Most cases that recover have retained some defect, such as blindness or deafness, or some form of paralysis.



**Treatment:**—Put the patient to bed in a dark room, which must be kept cool and quiet. Hyperpyrexia may require the application of cold, and venesection in suitable cases. Gelseminine seems better suited to these cases than aconitine, but if elimination is defective, veratrine is a better selection. Either should be rapidly pushed to full effect—a gr. of either given in solution every ten to thirty minutes, or a full dose administered at once hypodermically. If anything is required for the convulsions solanine may be given, gr. 1-12 every hour until effect. As the disease progresses cactin, and later digitalin or apocynin, will be required to sustain the heart. Infectious cases should be promptly and vigorously treated by saturation with calcium sulphide, and nuclein solution. Any accessible suppurative focus should be evacuated at once and thoroughly disinfected. As the acute symptoms subside the absorbent combination should be vigorously pushed to full effect. Epilepsy and other sequels require their appropriate treatment.

Chronic meningitis usually follows the acute attacks. In some cases the malady is at first latent. It may also follow sunstroke, syphilis or traumatism. The symptoms are persistent dull headache, increased by sleeping or lying down, or exposure to heat; pain in the neck radiating towards the shoulders; general spastic paresis, affections of the special senses, vertigo and epilepsy. The diagnosis from cerebritis is made by the absence of marked mental degeneration and the great spasticity present. In cerebral tumor, optic neurites with local symptoms are characteristic, while in hydrocephalus the enlargement of the cranium suffices. Complete permanent recovery is rare. The malady may, however, last for many years. In children it checks development and shortens life. Sight and hearing are generally permanently affected. The treatment is that of the acute form, with persistence in the use of absorbents. Sometime the application of iodoform ointment to the scalp may prove beneficial.

**Hemorrhagic Pachymeningitis:**—The most frequent cause of this affection is prolonged alcoholism, except as it occurs in epilepsy or mania. The symptoms develop insidiously, the patient complaining of headache, followed by dementia, loss of memory and incoherence with periods of excitement. Uremia may supervene from temporary disability of the kidneys. Recovery may ensue, followed by recurrence within a week, with muscular weakness, worse on one side of the body. The mental symptoms become more prominent, with delirium, general tremor, early spasticity, etc. Diagnosis is difficult, but the disease may be inferred from the history, the early development of spastic contractions and of mental aberrations. Apoplexy and nephritis present

symptoms not manifest in this malady. The patient dies usually within ten days. The treatment is that of acute meningitis. Surgical intervention may prove successful. The toxemia may be relieved by blood-washing—abstracting blood and injecting saline solution.

*Cerebral leptomeningitis* is usually an acute infection. The symptoms are headache, delirium, insomnia, coma, vomiting, constipation, fast pulse, hyperpyrexia, great mental anxiety, fever of the hectic type and rapidly developed. Convulsions and rigidity are less common; the headache less intense than in pachymeningitis. Suddenly developing local paralysis and spasms are frequent. The tache cerebrale may be elicited. The head is retracted.

Kernig's Sign: The patient cannot extend the leg when the thigh is flexed at a right angle with the body.

The patient generally dies within ten days, but crisis may occur or chronic septic inflammation follow. The treatment is that of pachymeningitis with especial attention paid to the septic element.

## HYDROCEPHALUS

The acute form may follow acute meningeal inflammation. It affects infants, especially marasmics. The symptoms are those of subacute meningitis with fewer convulsions and less fever. Muscular rigidity is marked. The cause is usually autointoxication, according to Pierce. The head enlarges, the fontanelles bulge and their tension increases. The eyes project from the sockets, the whites being especially visible above the cornea. The forehead bulges also and the sutures separate. The hydrocephalic cry is common. Percussion on the skull often produces an apparent tympanitic noise, and auscultation detects a bruit, synchronous with the pulse. Tetany supervenes. The disease consists of a subacute meningitis with effusion of serum, especially in the ventricles.

The prognosis is bad. In severe cases the patient dies within a few months or the attack may subside, leaving a permanent enlargement of the head, as a rule with mental impairment and spastic paralysis, but not necessarily.

Treatment should begin by sustaining the mother's health and ensuring her pleasant hygienic surroundings during pregnancy. Daily inunctions of cod-liver oil markedly increase the nutrition of the child. Calx iodata should be given to free eliminants of debris, and strengthen the cell-walls. Solanine is a better remedy for the spasms than the bromides, less depressing and less likely to disturb the digestion. Iodo-

form ointment applied over the scalp may prove of value. The bowels must be kept clear and disinfected. The hygienic influences are of the utmost importance: Fresh air and sunlight are the best remedies as prophylactics and cures.

#### CHRONIC HYDROCEPHALUS

The chronic form follows acute attacks, or may develop before birth or soon after. The causes are not known, but it may be assigned to bad hygienic surroundings, innutrition and dyscrasias of the mother. The head may be so enlarged as to interfere with birth. The lateral ventricles are greatly distended, the choroid plexuses vascular; the cerebral tissues greatly compressed, the basal ganglia flattened, the bones thin, the gaps partly filled in by Wormian bones. The symptoms resemble those of the acute form but are less pronounced. The reflexes are increased. The child sits, stands and walks late, becoming in time weak and spastic. The mental condition varies from imbecility to normality. The diagnosis is to be made from rickets, in which the head is square rather than round, and the ends of long bones are enlarged. When the disease develops late in life the patient suffers from headache, the gait becomes gradually irregular and ataxic, with a peculiar tendency to spasticity. Prolonged attacks of coma sometimes occur, with slow pulse from pressure on the pneumogastric nuclei. Optic neuritis occurs early and progresses rapidly. Suppuration may ensue. A serous form has been described by Quincke, occurring suddenly in children, with intense headache, cerebral pressure, slow pulse and choked disk, retraction of the head but no fever.

**Treatment:**—For the relief of pain we may choose between gelseminine for the febrile stages, solanine if spasm be marked or convulsions, cicutine hydrobromate for mental irritability or derangement. The bowels must be kept clear and aseptic. Absorption should be urged. The surroundings should be made hygienic, the diet carefully arranged and no precaution omitted which would tend to avoid irritation and favor the nutrition of the patient. The inunction of hot cod-liver oil is especially advised in the case of children.

#### APHASIA

In this malady the power of speech is disturbed. It is due to a lesion of the cerebral speech center, not to an affection of the tongue or its nerves, or of the coördinating tracts. It is divided into motor or sensory. Motor aphasia is also known as aphemia. One variety is caused by a



lesion of the foot of the left third frontal convolution; another by a lesion at the foot of the second central convolution. Total destruction of the first or Broca's convolution in right-handed persons makes speech impossible, until the corresponding convolution on the right side develops. In most cases we also find agraphia, or inability to write, possibly due to a lesion of the caudal extremity of the mediofrontal convolution. It almost always results when Broca's center is destroyed. Disturbance of pantomime expression nearly always accompanies disturbance of speech. This is known as amemia when due to cerebral disease, or paramemia when the signs the patient endeavors to employ are confused.

Sensory or receptive aphasia may be auditory or word deafness, visual or word-blindness, or apraxia or mind-blindness. The first is due to a lesion in the posterior third or first and second temporal convolutions. The patient is unable to read aloud correctly, or to verify what he reads by hearing. If complete he cannot echo spoken words. Motor forms may accompany it. Music deafness may be associated or absent. Between the auditory centers at the base of the brain and those in the left temporal lobe are also entering tracts for hearing, a lesion of which also causes a form of word-deafness. Word-blindness depends on lesions of the corresponding center for the storage of visual image, which is located by Ferrier in the angulooccipital region on the lateral surface of the hemisphere. Alexia, the inability to read, will be accompanied by agraphia, the inability to write. Examining for mind-blindness we seek to determine if the patient recognizes objects. Sometimes he cannot recognize friends by the sound of their voices. Conducting aphasia is due to lesions of the tracts associating regions concerned in the mechanism of speech. We therefore, have paraphasia and paramemia, the misuse of words in writing or of signs; parapraxia, the misuse of syllables or words in reading; and dyslexia, difficulty in reading.

## MALFORMATIONS

The most important of these is meningocele, a protrusion of the meninges from the skull or the spinal cord. Usually such tumors are covered by the skin. In the skull they are most frequent from the anterior portion, as the bones are thin and the fontanelle offers opportunities. The cause is an increase of the pressure from excess of fluid. Such children usually die before the expiration of a year. Besides the protrusion the symptoms are drowsiness, mental weakness, paresis and convulsions. The treatment is surgical and very unsatisfactory.

## APOPLEXY

This term designates an effusion of blood into the cerebral tissues. It is most frequently derived from the lenticulostriate arteries. The accident is known as a stroke, which may be due to hemorrhage, thrombosis or embolism. Predisposing causes are alcoholism, syphilis and other infections, arteriosclerosis and heredity; plethora from overeating may be added. Exciting causes are physical and mental strain. Strokes occur more frequently at night or in the early morning, and often follow a period of particularly good feeling, or euphoria. Sometimes one is preceded by vertigo or brief attacks of cerebral congestion. It may follow overexcitement or exertion, straining at stool or a particularly heavy meal. The attack is characterized by a sudden loss of consciousness, preceded by thick speech or motor aphasia, the face flushing, extreme objective vertigo, the patient falling unconscious; respiration is stertorous. Clonic convulsions may precede paralysis, which is usually on the opposite side of the body from the hemorrhage. Slight fever arises, while marked restlessness is succeeded by coma. If not profound, the paralyzed side is found to be hyperesthetic. The temperature increases on the paralyzed side. Hyperpyrexia is rare and generally fatal. As the patient recovers some consciousness he may move the healthy side, but not that which is paralyzed. There is apt to be retention of the urine. The deep reflexes are lessened. The eyes may be fixed, or turned from the paralyzed side; or if convulsions occurred, the head and eyes may be turned towards the paralyzed side.

In non-fatal cases improvement begins in three hours. The coma gradually lightens, the reflexes reappear and the patient may recover control over some of the muscles. Lying on the weak arm may cause pressure paralysis. The power of speech gradually returns, with some difficulty remaining perhaps permanently. There is difficulty in swallowing and dribbling of saliva. Taste is normal but the tongue protrudes to the paralyzed side, the face being drawn towards the sound one.

The paralyzed muscles do not degenerate, and the only wasting is that due to disuse. In a few weeks the patient will be moving about with a cane, the gait being characteristic. The arm improves more slowly than the limb, probably because it is not exercised as necessarily. The flexors tend to contract. Secondary degeneration of the nerve structures may follow, and extend to the other side of the spinal cord. Disuse of the muscles and joints leads also to trophic changes. Much of the disability supposed to be directly due to paralysis is really due to disuse. We have known a masseur cure paralysis of an arm in a few

moments by vigorous manipulation, the adhesions being broken up with distinctly audible sounds. Neuritis may also follow in the paralyzed part. The reaction of degeneration does not occur in muscles paralyzed by cerebral lesions. Vasomotor debility may cause sweating on the palsied side.

Cerebral hemorrhages usually follow disease of the blood-vessels, with degeneration of their walls and the formation of minute aneurisms. These may be caused by endo- and periarteritis. Fatty degeneration occurs also in purpura and other marasmic conditions, and in acute infections. These affect the smaller vessels, atheroma occurring in the larger ones. Hemorrhages occur in frequency as follows: The caudate and lenticular nuclei, meninges and cortex, centrum ovale, optic thalamus, pons, cerebellum and medulla.

When a hemorrhage occurs some nerve fibers are violently ruptured. Inflammation follows and around the zone of inflammation is another of edema, so that even when a small number of fibers are torn many others are inhibited by infiltration and pressure. The blood effused soon coagulates; the inflammation subsides; the serum and inflammatory lymph are gradually absorbed, as well as the clots, although the latter may leave a cyst containing fluid or else a scar, which is pigmented. As absorption proceeds the pressure is reduced and the inhibition of nerve function is gradually removed. For this reason the larger portion of the disability caused by such a stroke will disappear in time, but the presence of a scar will prevent reunion of the broken fibers. For this reason, while nearly all the symptoms will disappear in time, it is almost certain that some nerve fibers will be permanently disabled from resuming their function.

**Diagnosis:**—Embolism may be diagnosed by the history of heart-disease, by the slight disturbance of consciousness and the permanence of paralysis, which is sharply defined. A preëxisting heart-murmur may be found to have altered or disappeared. Thrombosis may be inferred if it has occurred in other parts of the body with extensive arterial degeneration. The onset is slow and progressive.

**Diagnosis:**—Half the cases recover from the attack, three-fourths of whom will have recurrence. In general, therefore, the life will be shortened and the working power impaired.

**Treatment:**—Put the patient in bed, with the head partly elevated; apply ice to the head and heat to the feet, but remembering that the patient is unconscious and anesthetic, do not freeze the scalp or burn the feet. Frictions to the legs restore circulation. Hot mustard baths or poultices are of value. False teeth may occasion strangulation and



should be removed. It may be necessary to prevent this by drawing out the tongue. Respiration can be aided by gently and firmly raising the larynx with the tips of the thumb and index finger. The inhalation of oxygen should prove of great value. To relieve the suffering brain, prompt and vigorous catharsis should be secured by giving croton oil, one to four drops, placed upon the tongue or in solution. General or local bleeding is useful in cases that will bear it. Absolute quiet must be enjoined, and no food given for 48 hours. After that very small quantities, not to exceed two ounces of fluid food, may be administered every two to four hours. The bowels should be kept clear by half-pint enemas of cold saturated salt solution. Nothing stimulating should be allowed unless heart-failure becomes imminent, which may be warded off by hypodermics of strychnine. The patient should not be allowed to sit up for three weeks, and at first then only for a few moments until the cerebral circulation is adjusted to the new conditions. Massage, however, can be commenced at the expiration of one week. Fever and increased vascular tension are best treated by veratrine or aconitine, unless delirium is present, in which case gelseminine is preferable. Either should be given in small and frequent doses, regulated by the effect upon the pulse. It is imperative that the physician see that the bladder is emptied at regular intervals. As soon as the inflammation has subsided efforts should be made to promote absorption of the effused matter by the use of the absorbent remedies so frequently advised in this section.\* These may usually be given with advantage for a period of one or two months. At the same time, after two weeks have elapsed efforts should be made to arouse the nerves to action, the remedies being galvanism and strychnine. When strychnine has been pushed to the limit and the patient is apparently unable to secure further benefit from it, decided improvement can yet be secured by substituting thebaine and pushing it likewise. The doses are the same as those of strychnine; the indication of full action likewise the same. These patients must not allow themselves to sink into disability from want of physical effort, or in a dread of exertion which is much like that felt by men when they first discontinue the crutch after a broken leg has healed. Nevertheless the man who has had a stroke must consider that his active life-work is done, and the balance of his terrestrial existence is to be devoted not to business or labor, but to keeping himself in health and prolonging his life.

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\*Mercury biniodide gr. 3-67, arsenic iodide gr. 1-67; phytolaccin and iodoform aa gr. 1-2. Give this three to seven times a day, just avoiding toxic effects.

**ENCEPHALITIS**

Inflammation of the brain substance may be caused by injuries, general or local infections, or by such affections as arteriosclerosis, which interfere with its nutrition. In the acute form the symptoms are mental confusion, slight fever and paresis of the extremities, sometimes convulsions or paralysis of the third nerve. The onset is rapid and hemiplegia may be present. The patient dies within ten days of cerebral compression, or of paralysis of the heart or lung centers. The disease is an inflammation of the brain-cells, with minute hemorrhages or hemorrhagic effusions. Optic neuritis may be present but seldom choked disk.

In the chronic septic form the same symptoms are present in moderate severity, sometimes with chills and fever, more frequently perhaps a subnormal temperature. This form generally follows infectious disease of the ear or nose. The malady is generally local, but there may be multiple suppurative foci. Convulsions and paralysis depend upon the irritation or destruction of the part in which the disease occurs. Abscess is most frequently in the cerebellum due to extension from the middle ear. The cerebellar gait will then be a feature, while convulsions and paralysis ensue if the abscess is in the motor area; deafness if in the sphenotemporal lobe; asteriognosis and mind-blindness if in the posterior parietal; and mental stupor ensues if in the frontal lobes. The diagnosis from brain tumor is made by the history, and the rapid progress in abscess. The patient dies within a few months. Sometimes the pus is encapsulated and the patient lives for years, although liable at any time to develop acute fatal symptoms.

The treatment is preventive, by the radical treatment of the oral or nasal disease, or simply surgical when the abscess has developed.

Chronic polioencephalitis superior presents the symptoms of the mild simple type, without pain but with involvement of the third nerve affording ptosis, exophthalmos, iridoplegia and external strabismus, unless the sixth nerve is affected.

Polioencephalitis inferior also presents the symptoms of the ordinary form with those indicating the involvement of the nuclei of the fourth and lower cranial nerves. There is no fever. The paresis indicates which nerves are involved. The prognosis is bad, diagnosis easy. Since consciousness is unimpaired the treatment consists in quiet, cold to the head, keeping up nutrition and keeping down vascular pressure, careful regulation of the diet so as to sustain nutrition; the absorbents should be employed freely, followed by zinc phosphide and neuro-leci-

thin. With these powerful remedies and the recognition of the imperative necessity of preventing fecal toxemia, the prognosis of many of these affections will be vastly improved.

### BRAIN TUMOR

Tumors of the brain are most common in young adults, their relative frequency occurring as follows: Tubercle, fibroma, sarcoma, glioma, carcinoma, and gumma. There may be a hereditary disposition to brain tumor. Gumma occurs in older persons. The general symptoms consist in mental excitement, reflex or cerebral vomiting, vertigo, choked disk and dull headache. The vomiting is of cerebral type and does not depend on food or digestion. Convulsions may be general or localized. Special symptoms indicate the location of the growth in the same manner as they do in abscess. Mental dullness or incoherency is specially indicative of disease in the frontal lobes. Tenderness over the tumor is a valuable sign if the growth is in the cortex, especially if developed by percussion. In the motor area the tumor will cause convulsions followed by paralysis; in the parietal region sensory changes with mind-blindness; in the temporosphenoidal lobe word-deafness; in Broca's region motor aphasia; in the corpus striatum paresis of the opposite side without convulsions, but with disturbed temperature, sometimes hyperpyrexia; in the optic thalamus hemianopsia and probably pupillary inaction; in the corpus callosum the same symptoms as sub-cortical tumors; in the cerebellum choked disk, ataxia, disturbed knee-jerk; in the gyrus uncinatus, perversion of smell; in the gyrus fornicatus, loss of smell; in the cuneus mind-blindness and hemianopsia without Wernicke's sign; disturbance of taste when its centers are involved. Pain is much greater if the meninges are affected. The growth is always surrounded by zones of inflammation and of edema. The diagnosis is difficult. Abscess may be recognized by the previous existence of septic disease of the ear or nose, and by the alterations of temperature, of the septic type. In meningitis we have the pain but not the local symptoms or intense choked disk. The prognosis is very bad; the treatment exclusively surgical, except with gummata. Here, as the utmost haste is necessary to limit destruction of tissue, the absorbent combination should be pushed vigorously.

### NERVOUS SYPHILIS

Syphilis affects the nervous tissues in the form of gummata or as a result of toxin causation, the "quaternary stage." The la-



does not cause specific lesions but is transmitted as a morbid tendency, appearing in the children as ataxia, or other neuroses. How many dyscrasias are due to syphilitic heredity is uncertain.

Tertiary lesions may appear as endarteritis obliterans, gummata or gummatous meningitis. The attack occurs some years after the initial lesion, with drowsiness by day and wakefulness by night, not due to feeble circulation; and persistent headache, mental dullness, failing memory but no delusions; diplopia, ocular palsies, strabismus, or restriction of ocular movement; general debility, exaggerated reflexes, local palsies, acute optic atrophy and neuritis, rarely choked disk, occasional convulsions, and various anesthetics and varied paresthesia. Syphilitic palsies are rarely complete or unrelenting. Early cranial palsies are diagnostically significant.

Spinal syphilis usually is accompanied by cerebral lesions. Symptoms are paresthesia of the lower limbs, with weakness and rigidity, incontinence or difficult urination, heightened reflexes, ankle clonus, hyper- or hypo-esthesia in irregular patches, disturbed coördination and Romberg's symptom. The reflexes are disproportionate to the palsy and loss of muscular tone. Contractures are infrequent. Wasting and fibrillary contractions are rare but cyanosis with cold extremities frequent. Bedsores are rare. The symptoms are not symmetrical. Remissions are also distinctive of the specific malady. The course is indefinite, leading to degeneration if not well treated. Occasionally sudden death occurs. The girdle sense of myelitis is wanting.

The prognosis is good if early recognized and intelligently treated. Haste is essential, since nerve cells and fibers once destroyed can not be rebuilt by drugs.

The absorbent combination should be vigorously pushed to full effect and this sustained as long as may be requisite.

## DEMENTIA PARALYTICA

This disease is also known as paresis or general paralysis of the insane. It consists in a progressive degeneration of the brain tissue, with peculiar mental conditions ending in dementia. It is believed to be a parasymphilitic affection, the patient being born neurotic, of syphilitic parents. It is much more frequent in men. Predisposing causes are alcoholism, sexual excess and excessive mental exertion, more especially the combination of all three. Syphilis is traced in three-fourths of the cases. Sunstroke, exposure, injury and acute infections sometimes are excitants. It is most common about the 30th year, in married men.

The first stage is that of excitement. The patient becomes irritable, over-annoyed by trifles, slovenly in his business, easily fatigued and inattentive, extravagant and unwise. This is followed by a condition of exaltation, in which he is very happy, prosperous and successful in all matters. Delusions of grandeur are periodic and interrupted by outbursts of violence, especially if he develops periodic dipsomania. If early put under restraint apparent or real remissions may occur, but usually dementia supervenes gradually and increases until his mentality is extinguished. The hand-writing becomes wavering, facial tremor occurs and tremor of the tongue, the speech is thick and stuttering, knee-jerks increased, pupils unequal and sluggish; the sexual function weakens early; dribbling of urine occurs; the appetite is gluttonous and fat accumulates. Convulsions, hemiplegia and apoplexy may occur. As dementia crawls on the patient grows quiet, sleeps by day, is very forgetful, does not recognize friends or take interest in anything. He grows dirty and childish; even then when excited he may have delusions of grandeur or persecution.

In another type the malady begins with dementia, without grandeur or any delusions at all. Tremors and the other symptoms appear as above described. In still another form the type is that of hypochondria and neurasthenia. The patient has vast distresses in the head, or migraine, pain in the back and limbs, or dull pain in the epigastrium. In the course of a year mental derangement appears, with suspicion, dementia, delusions of persecution, etc., with violent outbreaks. In cases of acquired syphilis similar symptoms may follow tertiary deposits, and disappear under treatment. A similar condition also occurs from alcohol, with progressive mental deterioration.

The blood-vessels are thickened, the nerve cells degenerated, the connective tissue hyperplastic, the dura vascular, the brain mass atrophied, the cerebrospinal fluid increasing. All the membranes are thickened. In fact the brain is cirrhotic, the neurons fatty. The cord may participate in the disease and ataxic phenomena complicate the picture. The treatment is uncertain. Antisyphilitic treatment if employed early sometimes stops the course of the disease. Excepting this we have little from which to hope, although benefit may result from the use of nuclein or neuro-lecithin, as well as from the accessory remedies, massage and various forms of electricity and hydrotherapy.

## MINOR CEREBRAL MALADIES

Cerebral hyperemia results from hypertrophy or over-action of the heart, excessive mental activity, vasomotor spasm of the periphery, and

the action of any agent that dilates the cerebral vessels, such as alcohol, the nitrites, and the atropine group. The remedies are the cardiac depressants, gelseminine, veratrine and aconitine, as named, and quick and powerful action on the bowels as by elaterin.

Cerebral congestion occurs when the bloodvessels are engorged by back pressure, as in disease impairing the tricuspid valves, pressure on the superior cava by tumors, suffocation, strangling, and excessive and prolonged muscular strain with breath held. The remedies are those required by the condition, but emergency may demand venesection, or quick depletion of the bulk of the blood by exosmotic enemata or purges.

In hyperemia we see evidences of irritation—headache, vertigo, insomnia, quick and hard pulse, bright eyes, and a choleric temper, flashes of light, and even convulsions. In the latter the patient and his senses are sluggish, dull, the temperature subnormal, lips cyanotic, and the evidences of advanced obstructive circulatory disease are manifest.

Cerebral anemia may be due to exhausting discharges, hemorrhages, feebleness of the heart, relaxation of the abdominal vessels, the quick evacuation of the bladder or of ascitic fluid. Brunton has illustrated the syncope following a person's rising from recumbency to empty the bladder, the release of abdominal pressure being followed by the blood collecting in the abdominal vessels and failing to reach the brain—sudden faintness may follow, and may prove fatal in those whose heart-force is deficient anyhow. The writer recently lost a relative who, suffering in advanced age from a fatty heart died instantly when rising after kneeling in prayer.

The symptoms are pallor, feebleness, vertigo, dull headache, flashes and flushes, rapid respiration, fast weak pulse, both increased by slight exertion, coolness of the skin and extremities, profuse cool sweat in suddenly developed anemias, and fainting fits. The ordinary evidences of general anemia are present. The treatment depends on the cause. Glonoin most quickly returns the blood to the head; atropine prolongs this effect and acts quicker for the glonoin, and brucine strengthens the heart. Give glonoin and atropine gr. 1-250 each, and brucine gr. 1-134, together, every five minutes till the face flushes, then less frequently. Keep the head low and the feet raised above its level.

Cerebral edema occurs in nephritis, senile and other atrophies, and in the later stages of chronic alcoholism. The symptoms are those of anemia and dementia.

*Embolism*:—Vegetations from the heart are carried into the cerebral arteries, cutting off the circulation, and if septic occasioning septic abscess. During pregnancy and in some infections like diphtheria and pneu-



**monia** the blood is abnormally coagulable and fragments of heart clots are likewise washed into the arteries. If not septic the cerebral area affected softens, being red at first from hemorrhages or infarction, yellow as the hemoglobin is absorbed, white in the commissural tracts. The neural tissue disintegrates and the connective proliferates forming a cicatrix. Large tracts may result in a cyst.

Thrombi form in the cerebral arteries from disease of their walls, extensions, traumatisms, aneurisms, blood diseases, or embolisms; causing changes in the walls, retarding the current, etc. In the veins or sinuses they form from general or local disease. In primary thrombosis the superior longitudinal sinus is more frequently affected. In secondary forms it is the part nearest the causal malady.

In embolism the onset is sudden with loss of consciousness, shock, coma, convulsions and delirium, three varieties being distinguished as the apopleptic, convulsive and delirious. Thrombosis usually begins gradually with vague pains, numbness, tingling, headache and vertigo. The mind weakens and strength decays. Other symptoms depend on the location of the lesion. Treatment is not very effective. Enjoin rest, meet symptoms, sustain strength and quiet vascular excitement, treat the causal malady when possible, and establish a salutary regime. In secondary thrombosis surgical aid may release pent up collections and remove carious bone. Keep up elimination. Employ the absorbents when indicated. Stimulate tissue restoration by means of zinc phosphide and neuro-lecithin.

## ACUTE DELIRIOUS MANIA

This malady is an acute periencephalitis, displaying minute hemorrhages in the meninges and gray matter. It occurs in neurotics, after alcoholic or sexual excesses, prolonged anxiety, parturition, menstruation, insolation, acute infections especially pneumonia, and sometimes without evident cause.

The patient is restless, melancholy or anxious, has anorexia, constipation, and loses flesh. The mind weakens. Bad dreams or nightmares occur. Fear of mental disease is present but merges into an attitude of defiance or quarrelsomeness, passing into violent delirium; beginning suddenly, confusional, with intense excitement, fear, delusions of persecution and hallucinations. The tongue is dry, pulse fast and weak, petechiæ appear and fever rises to 105 or more. Hyperesthesia is present. This stage passes rapidly into that of collapse, with higher fever, stupor, growing debility, eyes hollow, low muttering, skin dry and cyanotic, pupils dilated, and death within three days. There may be remissions.

Diagnosis is not easy. The fever distinguishes from ordinary malaria. In delirium tremens we see the tremors. The course may be extended to several weeks. The prognosis is always bad, worse for men.

The treatment should be by the most active antiphlogosis. Venesection may be employed freely, and elaterin is always advisable, but gelseminine should be promptly and strongly pushed to production of ptosis and kept up. Meanwhile the absorbent combination is to be employed energetically. Hyoscine is the best remedy to secure sleep. Cicutine hydrobromate and solanine are useful. The strength must be sustained by suitable diet, and heart tonics employed as soon as the symptoms admit.

### PARALYSIS OF CHILDREN

Several forms of paralysis have been described as occurring in children especially. These include hemiplegias, the polioencephalitis of Struempell, congenital encephalitis of Virchow, and meningoencephalitis, and a majority of cases to which no lesion has been attached. Atrophy, hypertrophy and sclerosis follow, or the paranecephalia described by Heschl in which the brain tissue is replaced by cysts.

The causes are unknown. The symptoms resemble those of similar maladies in adults—sudden loss of consciousness, convulsions, always fever, hemiplegia, mental deficiency, the course resembling that of adults.

Other palsies date from birth and may be due to the misuse of forceps; occurring as paraplegias, with increased reflexes, spasticity, and lack of mental development. Van Gehuchten concludes that these cases occur in premature children more frequently and not after difficult labors. The prognosis is never very good. The treatment is that of adult cases. Mental and muscular training is important.

## IV. DISEASES OF UNKNOWN PATHOLOGY, Etc.

### VERTIGO

In objective vertigo the patient has a sensation as if visible objects at rest were moving; in subjective vertigo he feels as if he himself were moving.

**Etiology:**—Vertigo may be due to blood conditions, anemia or hyperemia; to toxins, tobacco, autotoxemia, lead, alcohol; to arteriosclerosis and other causes of hypertension; to aural irritations, neuroses, reflex causes and such mechanical causes as swinging, sea and car-sickness.

**Symptoms:**—The paroxysms are sudden and brief. Faintness with apprehension attend. Mental confusion ensues, with nausea, the patient catching at firm objects to keep from falling. Lowering the head usually relieves. There will be symptoms of the causal malady, which may be disease of the labyrinth, the cerebellum and its peduncles, degeneration of kidney structures, neurasthenia, hysteria, sources of reflex irritation anywhere, astigmatism or other ocular maladies; dyspepsia, indigestion or constipation, vertigo being very frequent with pyrosis; tea or coffee in excess, deficient renal action, feebleness of the heart, fever or determination of the blood to or from the head from any cause so as to disturb the cerebral circulatory equilibrium.

It will thus be seen that vertigo is a symptom that may present itself in many diverse conditions and diseases. The diagnosis is always therefore as to the underlying malady. The prognosis depends on the curability of the cause. So does the treatment. Cerebral anemia demands lowering of the head, as hyperemia requires it to be elevated. Therapeutically we accomplish this by the administration of a sufficiency of aconitine, veratrine or gelseminine on the one hand, or of glonoin, atropine and strychnine on the other. The bowels must in all cases be made and kept clear and aseptic, and the renal elimination maintained. Weak heart requires the patient to lie still until the tonics given have had time to act. Persistent vertigo depends on a continuously acting cause.

## INSOMNIA

The need for sleep is so imperative that it is impossible for a healthy person to remain awake indefinitely. The time required differs largely, and Franklin's maxim of "six hours for a man, seven for a woman, and eight for a fool," only applies to those who are suited by it. Few men require less than six hours, and exhausting work, physical or mental, may necessitate much more. Children should have more than that; in fact, as much as their natures seem to demand.

The tendency to insomnia may be hereditary. It is more apt to show in brain workers, the toxins inducing sleep being developed by muscular exercise. Gout and other causes of increased vascular pressure cause it directly, and as primary causes of tension we may mention autotoxemias of various forms. Feebleness of the heart causes somnolence from cerebral anemia while standing or sitting up, the weak vessels of the brain collapsing when the patient lies down and permitting a cerebral hyperemia that induces wakefulness. Syphilis, malaria, uremia, the saturnine and other cachexias, induce wakefulness. Neurasthenia probably acts through



the vasomotor conditions above noted. Worry and other overpowering emotions prevent sleep or render it unrefreshing. Some form the habit of sleeping only during a certain period of the night or day, while other awake at a fixed time no matter when they retire.

Loss of needed sleep causes irritability and mental fatigue, especially in adults. This will increase until, as in the days of the Inquisition when forced wakefulness was employed as a method of torture, insanity results. In fact, there is some danger of this whenever any patient fails to sleep when all obvious difficulties have been removed.

In treating insomnia the first duty is to ascertain if the causes are removable. Against them the therapeutics should be directed. The fulfilment of this indication will necessitate a close inquiry into the personal habits, and a shrewd surmise as to certain matters which the patient may not care to discuss or to tell his adviser the truth about. The sexual life must be investigated, not necessarily by direct questioning, and properly regulated. Men must learn to leave the cares of the office at the office, and to wrench the thoughts away from disquieting matters that inhibit sleep. If business prevents sleep, give up business; for surely insanity cannot further business interests. Men's need for bodily exercise may be measured by their muscular development—and as most men pride themselves on manly strength the suggestion that a man must exercise in proportion to his muscular powers to retain health will induce the majority to acquiesce in the necessity of physical labor.

The drug therapeutics first takes into consideration the vasomotor conditions. If the heart is so weak that on lying down the cerebral vessels dilate and prevent sleep, a suitable dose of digitalin (average gr. 3-57) or of any cardiac tonic, will give certain relief. If on the other hand there is cerebral activity from hyperemia and abnormal vascular tension a few granules of aconitine, veratrine or gelseminine will restore normal conditions and permit refreshing, physiologic rest. Probably solanine will act well in those medial states where there is not a very clear indication for either. But if the bowel is loaded or the kidneys are not ridding the blood of their due proportion of toxins reason calls for the treatment of these conditions at once; and here as so often is the case, the suffering is nature's effort to direct our attention to conditions requiring relief and threatening danger.

A hot or cold foot-bath will often restore circulatory equilibrium and permit sleep. When a man is irritated or worried and wakeful a prolonged hot bath has a remarkable soothing effect, somewhat similar to that of a cigar. Both act by lowering abnormal vascular tension.

Frankly, we know of no indication warranting the use of opiates or their ordinary substitutes for insomnia. If the above measures will not give restful sleep the case is so serious that a thorough investigation is requisite and a radical change in the life, in fact dropping all else in the effort to save the reason and the life of the patient. The use of opiates leads to the certain drug habit; bromides relieve by drugging down into insensibility the protests of nature, and depress the vitality when it most needs strengthening. Chloral and its succedanea may be indicated as remedies for disease but they are assuredly not remedies for insomnia *per se*. Hyoscine will put the man to sleep and so will a knock-out blow on the point of the jaw, but we are not prepared to signify our preference. One concession we will make to the votary of fashion or business—a glass of hot water at bedtime with seven granules of avenine dissolved in it, is quite effective and harmless, the sleep being singularly refreshing and the patient awaking with a restful sensation.

### PARALYSIS AGITANS \*

Shaking palsy or Parkinson's disease occurs at or after 40, from heredity, overwork or spinal trauma. The symptoms are paresis, with a fine constant tremor, beginning in the hands, face and lips and extending over the entire muscular system. It is usually continuous, not developed or aggravated by volitional movement, and can be momentarily checked by an effort of the will. The face is expressionless, reflexes increased, cerebration slow and speech slower. Later we see dribbling saliva, stooping, with rigid neck, pill-rolling motion of the hands and fingers, and the festinating or running gait. The heart is weak, palpitation follows slight exertion, there is arteriosclerosis, frequently iridoplegia in myosis. At first the tremor is more evident in relaxation or after unusual exertion. It may even prevent sleep, but eases during sleep. Sensory phenomena are rare except paresthesia, or when trophic joint changes develop. Small motions first become difficult and then impossible, larger movements later. The face, neck and body sometimes flush, with sweating. The sphincters are unaffected. The duration is indefinite, death due to intercurrents or gradual decay.

In many cases no lesions have been found. In others there are congestion and dilatation of blood-vessels of the gray matter, atrophy and pigmentation of nerve cells, hyperplasia of connective. Dana attributes the malady to disease of the central motor neurone. Recovery never occurs but the disease may be checked if taken early. Remissions



are notable. Hereditary cases are less amenable to treatment. Great development of tremor roughly corresponds with early paresis.

Treatment calls for rest, forced nutrition, the best hygienic surroundings and regimen, with careful training of the affected muscles. Tonics, warm baths and galvanism are useful. The remedy most successful in restraining tremor and securing rest is hyoscine hydrobromate, in doses of gr. 1-100 two or three times a day. This may be continued for many years without increasing the doses. Cicutine hydrobromate is a useful addition. Cannabis and arsenic have been recommended. Testicular injections have proved beneficial. Elimination must be sedulously maintained. Nuclein and neuro-lecithin should receive trials, and zinc phosphide. It is incredible that in a malady wherein spontaneous remissions occur, there should have been no trial of such remedies as are directly indicated on strictly scientific grounds.

## CHOREA

The causes of chorea are uncertain but a connection with rheumatism exists in some cases, while the neurotic condition predisposes. Exciting causes are mental, moral or physical strain. The strain of an imperfect eye may readily cause the disease. It arises also during pregnancy. Two-thirds of the cases occur in females, beginning most frequently between the seventh and fourteenth year. It is rare in the colored races.

The earliest symptom is fretfulness and "fidgets," with all sorts of movements indicating general discomfort. Irregular jerking movements then begin in the arms, face, tongue and legs. These movements are irregular in type, the face muscles twisting and working, speech difficult, saliva dribbling, the aspect being that of dementia, although the mental perception may be hyperacute. The movements grow larger, until the child is thrown about so that she can neither walk, sit nor lie quiet in bed. In some cases paresis develops, the patient at times being almost motionless; in other cases the two elements are mingled. The motion ceases during sleep and is decidedly less marked when the child is quiet, increasing on physical or mental exertion. It may be confined to one side and is frequently worse on one side than the other. Mental development is checked, but rather as a consequence of the disability imposed by the disease. In some cases, however, dementia supervenes, or even mania. Mitchell divides chorea into five types: 1st, those without movements during rest at some period; 2nd, cases with continued movements increased by effort; 3rd, cases where chorea disappears during volitional movement; 4th, cases unaltered during volitional movement; 5th, cases



with alternating types. In bad cases the child may injure himself by tossing and sleep may be rendered impossible. Anemia generally attends, and the heart is weak and irregular. A systolic mitral murmur occurs in three-fourths of the cases. Uncomplicated cases last from four to six weeks. Recurrences are common in the spring or fall; but these are shorter than the first attack. During convalescence the jerking gradually subsides and the paresis may then be more prominent. These movements cease last from the face and tongue. The anemia may become extreme, the heart fatty, the ankles edematous. The urine is deficient in chlorides, with excess of sulphates and phosphates, and the presence of indican frequently shows the presence of fecal toxemia (Pierce). The knee-jerk is capricious, often weak, always quickly exhausted.

Chorea is to be diagnosed from hysteria, habit-chorea and cerebral palsies. Huntington's chorea occurs in adults, with mental diseases, and is hereditary. The prognosis is generally good. The course is longer if the heart is affected, and in anemics.

**Treatment:**—We first seek for the cause. Eye-strain especially should be looked for and corrected. Autotoxemia should be obviated, by keeping the bowels empty and aseptic. Renal elimination should be measured and brought up to the standard. A careful examination of the child's entire body, especially including the sexual organs and the rectum, should be made, and all possible sources of reflex irritability removed. In every case the child should be sent to bed and kept there, without books, toys or visitors. In violent cases it may be necessary to pad the bed or the child. Hot salt baths with massage should be used every day. Anemia calls for iron; feebleness of the heart for cactus, and any other general condition present, such as rheumatism, must be promptly and effectively treated. Cases presenting excessive violence are greatly benefited by glonoin. In other cases the motions are restrained and the nervousness soothed by gelseminine, cicutine hydrobromate or solanine, pushed to full dosage. The best hypnotics here are hyoscine and cicutine hydrobromates. Arsenic has proved beneficial as a heart- tonic and an adjuvant to iron in anemia. Macrotin comes near to being a specific as soon as the attack has passed its acme, when it should be given up to full toleration. When convalescence has well advanced, change of scene is advisable, but excitement of any sort must be avoided, as well as hard study and fatiguing exercise. These cases do well at the seashore, but are aggravated by any altitude above 2,000 feet. Rhythmic exercises in time with music, are of value in restoring control over the muscles.

### HABIT CHOREA

This disease of childhood may develop primarily or follow simple chorea. It is hereditary and may be contracted by imitating another choreic. Other causes are eye-strain and similar sources of nervous exhaustion. The disease most frequently affects the eyelids, face, neck, and shoulders. The movements are spasmodic rather than choreic, and are excited by irritations abnormally felt by the patient. The movements can be controlled by the will, are absent during sleep and worse when attention is not directed to them. They may be controlled by the will more readily than simple chorea. The patient is apt to be robust. Speech may be affected. The duration is indefinite, but the prognosis is good in choreic cases, or when the source of irritation can be found and removed. The treatment consists in finding and removing the source of irritation, which may require fitting with glasses, circumcision in either sex, attention to the teeth, the removal of diseased tonsils or adenoids, operation for tongue-tie, etc. Effort should be made to train the child in controlling these manifestations by his will. The use of cicutine hydrobromate or of solanine to lessen hyperesthesia may be of value, but these remedies are not to be employed to relieve the physician of the trouble of finding and removing the cause of the irritability. As in ordinary chorea, calisthenics in classes, with music, aid in restoring control. Cold baths of all kinds are of value. The bowels must be kept clear and aseptic.

### HEREDITARY CHOREA

This malady is more frequent in men, commencing about the 30th year, is chronic in its course and tends to mental derangement. Heredity is not direct, but is of the neurotic temperament in general. The first evidence of the disease is a gradual change in the disposition, the patient becoming nervous, irritable, forgetful, perverse and quarrelsome. Movements begin in the arms, large; the head and neck becoming affected, the legs lastly, with peculiar gait. The patient endeavors to slide and push one limb forward, then draws up the other one, which is pushed forward in the same manner. Extending to the trunk the muscular contractions cause compression of the abdomen and thorax. Involvement of the diaphragm causes sudden explosive sounds. With the choreic movements the mental symptoms are apparent. Periods of depression alternate with mania, and dementia supervenes, the patients using a jargon in speech, not due to mechanical disturbances which also

exist. Suicide is frequent. Walking becomes impossible, but the movements continue except during sleep. They are increased by mental or physical effort, but lessen with the approaching dementia. Finally the patient is confined to bed, and dies of intercurrent disease, after a number of years' course. The diagnosis is made by the age of the patient, the mental disorder, and the peculiar gait. The prognosis is usually bad. The disease is attributed to congestion of the cerebral cortex, with irritation and degeneration of the central motor neurons with areas of softening corresponding to the paresis. No treatment has yet proved curative, but as applied to the symptoms the patient's condition has been ameliorated.

### CONVULSIVE TIC

In this disease we have large irregular choreic movements of the face and neck, sometimes extending to other parts. The neurotic heredity is present, while emotional shock is the most common excitant. It begins in early childhood, with three sets of symptoms: the movements described, being extreme contortions of the part affected, increased by excitement or exercise; the mental disturbance consisting of fears, doubts and morbid impulses. Attempts at motion are frustrated by the involuntary retraction of the muscles. The disease passes into chronic dementia, with muscular atrophy and death from exhaustion. No treatment has proved of avail. The disease usually begins in the eyelids, the patient winking or grimacing uncontrollably. Many singular forms are described.

### SALTATORY SPASM

This is a hysteric neurosis occurring in young adults, spreading by simulation, characterized by sudden violent jumping or dancing, continued until the patient is exhausted and renewed after resting. The paroxysms may recur many times in a day, recommencing as soon as the patient awakes from sleep. The malady develops when the reason is swerved by powerful emotional storm, such as religious revivals. The exhaustion is sometimes fatal. The cure is usually suggestive and is easy when the operator can obtain control of the patient.

### EPILEPSY

This is a disease characterized by convulsions with unconsciousness. It is a hereditary neurosis, occurring in either sex and earlier in life as the neurotic heredity is more marked. Exciting causes are mental



shock, traumatism, diseases of the brain, toxemia, reflex irritation and circulatory disturbance. It is a feature of a number of diseases of the nervous tissues and may be a sequel of such maladies as cerebrospinal meningitis.

*Grand mal* may be general or partial. Confirmed epileptics show a characteristic facies of mental depression and irresolution. The attacks may be preceded by headache, giddiness, muscular twitching, mental depression or disorder. Sometimes the attack commences with an aura. This may be a sense of depression, a cloud dulling the vision, or the sense of a globe rising from the stomach to the brain, or of a wave or breeze from any part of the body traveling to the brain, the convulsions developing when the brain is reached. The aura may be a pain, paresthesia or a disorder of any one of the special senses, or it may be a tremor. We have known it to occur with twitching in the muscles of a hand, bruised by the handle of an oar in rowing, the twitching visibly passing up the nerves of the forearm and arm. Following this we may see movements in any part of the body, the patient becoming pale, cyanotic and unconscious.

In *petit mal* this may constitute the entire paroxysm, or the patient may during a period of unconsciousness perform some act, the attack lasting but a few seconds. In *grand mal* the attack may begin with a cry, the patient falling unconscious with a general convulsion of tonic rigidity, followed by clonic spasms, frothing at the mouth, conjugate deviation of the eyes upward and outward to the side most affected, and dilated pupils. As the tongue is violently forced out of the mouth during the clonic spasm it may be severely bitten during this stage. The convulsion ends in rigidity of the muscles of the trunk. The bowels and bladder may be emptied. The whole convulsion is over within a minute or so, and the patient may be restored to consciousness, although he is apt to remain dull for a few moments, or with aphasia, or he may sleep for some time. Temporary paralysis may remain, or the patient may show decided mental disorder, usually an ugly quarrelsome mania. In masked epilepsy substitution phenomena may occur instead of the attack, or a state of double consciousness may exist. The attacks may follow each other so closely that the periods of unconsciousness are merged, and the patient may remain for days or weeks without regaining consciousness. The muscles may be sore and bruised, or ruptured during the convulsion, the bones broken or dislocated. Patients may be frightfully burned by falling into the fire. Convulsions at first occur at night, or in the early morning, but later occur during the day. The convulsions may be absent during intercurrent fevers or pregnancy.

Gowers mentions the following forms of *petit mal*, arranged as to their frequency: Sudden momentary unconsciousness; fainting or sleeping without warning; giddiness; jerks or starts of the limbs, trunk or head; disturbances of sight; sudden mental disturbance; unilateral peripheral sensation or spasm; epigastric sensation; sudden tremor; sensations in both hands; pain or other sensation in the head; choking; sudden scream; sensation of smell; sensation referred to the heart; sensation referred to the nose or eyes; sudden dyspnea and general indescribable sensations. After these, automatic actions may be performed. The tendency is for the milder forms to merge into the more severe, for the nocturnal attacks to gradually become diurnal, and for the convulsions to recur at shorter intervals. Leucocytosis exists in both forms.

Epilepsy must be distinguished from hysteria, which may require a careful study. In the latter the pupils are not dilated, the tongue is not bitten, nor does the patient hurt or disfigure herself seriously. Uremia may be detected by examination of the urine.

The pathology baffles research. If the patient dies in a convulsion the brain shows the effect of the tremendous vascular pressure by minute hemorrhages. Other lesions discovered are not characteristic, since they occur without epilepsy and it occurs without any of them. Haig showed that uric acid completely disappeared from the urine on the day before a convulsion occurred. The prognosis is worse the earlier in life the malady commences. In some cases mental degeneration is rapid; in others the mental development is greater than in ordinary individuals. Epilepsies (Jacksonian) limited to one part of the body point to a corresponding location in the brain, and the lesion there may be removed by surgical intervention.

**Treatment:**—The first point in the treatment is to submit every portion of the patient's body, external and internal, to the most critical examination, that we may detect any possible source of reflex irritability. Nothing is too trivial to go unnoticed. It is not necessary that there should be the slightest obvious connection between the lesion found and the disease. The rule is to treat whatever is found. Eye-strain is to be remedied; adherent prepuce removed; the spasmodic sphincter dilated; worms removed from the alimentary canal, etc. In epilepsy we have to deal with a nervous system morbidly impressible, and with an irritation capable of inducing spasms in such a person. Autotoxemia may well constitute a cause of such irritability, hence attention to the alimentary canal is one of our first duties. Epileptics are very often gluttons, and the restriction of food to the patient's needs should follow the cleansing of the alimentary canal and the removal of intestinal parasites.

All salt should be excluded from the foods, and substituted by sodium bromide, in just sufficient quantity to replace the excluded chloride. Beyond this the bromides should not be given excepting in occasional instances. The writer has succeeded in preventing spasms for many months by keeping the patient saturated with potassium bromide, giving it up to 600 grains a day, increased or decreased according to the patient's sensations. But such cases are not by any means common, and in general this remedy is objectionable, since potassium itself is a convulsive agent, and in large doses this salt interferes with digestion, causes distressing acne, and depresses the vitality markedly, as shown by its extinguishing the sexual capacity, though not the appetite. We grant that in many epileptics this is a good thing, since they are passionate, headstrong and unruly. Nevertheless we cannot but look upon the power of a drug to extinguish this function as one which is perilous to the patient's vitality. We are not justified in striking so close to the vital principle as is signified by such an action, unless the indications for such action are clear.

Solanine fulfills all the functions of the bromides without either of the three disadvantages enumerated. It may be substituted for the bromides in all instances except as noted, with great advantage. We do not advocate solanine as a remedy for epilepsy, but as a remedy which will certainly and safely lower hyperreflex excitability, and when that constitutes the indication for treatment the remedy may be depended upon. Ordinarily the dose should not exceed one grain a day, but it may safely be given until its effects are manifest, the first one being dryness or irritation of the mouth and throat.

Valuable adjuvants may be found in the other sedatives, such as gelseminine and cicutine hydrobromate, either of which may be pushed to full dosage.

Beyond this the treatment is symptomatic. When we have removed all possible sources of reflex irritability, have soothed that irritability down to the normal point and have regulated the personal and domestic hygiene we have done all for which we have scientific warrant in the treatment of epilepsy. In many cases the mental deterioration occurring in epileptics is of subjective origin, and would not follow if the patient did not know of the epilepsy or did not care. If the heart is feeble digitalin may control the disease where other remedies fail.

Pierce recommends the intestinal antiseptics and colonic flushing when examination of the urine indicates the need. The absence of uric acid from the urine warns us of an approaching convulsion, but as yet the specific treatment that will prevent it has not been developed.



The writer's observations would indicate that veratrine in full doses best meets this indication. Since the spasm commences with contraction of the cerebral vasomotors, the instant administration of glonoin will generally prevent the further development of the convulsion. As the effects of glonoin are transitory, however, atropine should be combined with it to prolong the effect. The dose is gr. 1-250 of each, and this combination has proved so valuable that it has been termed the "antiepilepsy" granule; a bad name, since it is not a remedy for epilepsy at all but for vasomotor spasm, whether the latter occurs in epilepsy or in any other malady. These should be carried about by the patient, ready for instant use.

## HYSTERIA

Hysteria is a functional neurosis, characterized by such a variety of phenomena that it has been said that this malady simulates every known symptom of every known disease, including death. It is more common in women, and that it occurs in those affected with diseases of the reproductive apparatus is evidenced by its name.

Hysteria is one of the less serious inheritances of the neurotic Constitution. Given an individual whose mental and physical constitution is considerably below par as to its capability of resisting the trials incident to life, add to such a case the influence of bad environment, and hysteria results from any cause of irritation as a spark sets off a powder magazine. In hysteria we find the emotional side of the patient's nature highly developed; the control of the will low. The visual field is often narrow, with reversals so that red is perceived before blue. Various visual disturbances may be present also, or disturbances of any of the other special senses. Hysterical points are found by pressure over the dorsal, cervical and lumbar spine, over the ovaries and under the breasts. Anesthetic areas may also be found, sometimes sharply defined hemianesthesia. The hysterical joint is rigid and tender. Paresthesiæ are very common and multifold. Motor symptoms may be present of any grade. An exceedingly rapid quivering of the eyelids is common in paroxysms. Catalepsy, palpitation, rapid breathing, excessive or scanty urine, hematuria, dysmenorrhea and amenorrhea, extreme tympanites and rumination are not uncommon. The paroxysms consist in violent spells, local or general convulsions, simulating epilepsy or tetanus, or multiform attacks. The patient does not injure or disfigure herself seriously. She is perfectly conscious and able to control the manifestations if she chooses.

The diagnosis is sometimes difficult, in fact it is easier to recognize the hysteric condition than it is to describe it. However, the diagnosis should not stop with the determination of hysteria. We have known convulsions to be diagnosed as hysteric in a patient unquestionably hysterical, yet the convulsions were caused by a pelvic abscess and promptly ceased when the abscess was evacuated. The diagnosis must therefore ascertain why the patient is hysterical. The cause may be strictly physical, as in the case just cited, and in others where health was restored by ridding the patient of intestinal worms, or of an adherent prepuce, or of an anal fissure. It is incredible to those who have not studied the matter, how an apparently trivial disorder may cause such a leakage of nerve force, already far below par, as to induce the most formidable phenomena. The removal of a corn has often restored peace to a perturbed mind.

But the causes of hysteria are not to be found alone in the physical realm. Quite frequently these overindulged, capricious creatures go off into a spasm to revenge themselves for some slight disappointment. Many cases can only be comprehended when the sexual relations have been investigated, and here the physician not seldom meets with conditions which can only be met by quietly taking his departure and suggesting the employment of another adviser.

The neurotic instability may be lessened by attention to the personal and domestic hygiene, by keeping the digestion in good order, prescribing a light but nutritious diet, with quiet, absence of unwholesome excitement, with pleasant surroundings and diversions, and occupations suited to the mental and physical capacities of the individual. The paroxysms may be easily broken by a hypodermic injection of apomorphine.

The further treatment depends on the conditions. The removal of autotoxemia does wonders. Gelseminine subdues erotic sensibility; cicutine hydrobromate seems to be a specific in relieving that mental condition which leads the friends to fear the approach of insanity, while the dread of insanity or other approaching evil subsides under the use of anemonin. Any of the valerianates restores self-control when lost through grief or other overpowering emotion. These remarks may appear fanciful or absurd to him who knows only mechanical or material therapeutics. The writer speaks, however, from long experience.

## TRAUMATIC HYSTERIA

This title has been assigned to cases of hysteria following injury. It is otherwise called "railway spine." There is a wide variation in

the opinions of those who treat of this disease. A distinguished railway surgeon was so skeptical in regard to such cases that he was pointedly asked whether he believed there were any circumstances under which a railroad could possibly be in the wrong, or responsible for injuring its victims. There is no question but that great imposition has been practised upon corporations by seekers for damages, but this does not indicate that injury is impossible, even if no evidences can be elicited by physical examination.

The symptoms follow injury received while traveling. The patient believes or pretends that he is injured, although no evidences can be elicited by examination; or there may be subacute inflammation, hemorrhage or degeneration of the spinal cord. The patient generally complains of stiffness in the back, with points of exquisite tenderness, elicited by superficial pressure. He becomes irritable and tires quickly, suffering with palpitation, bradycardia or tachycardia, showing widespread irritability of the sympathetic nerve. Other vasomotor changes are sweating, coldness and flushing, but not cyanosis. Functional disorder of any other organ may be present. The deep reflexes are exaggerated, but ankle clonus is not present. The muscles are flabby but not wasted and the reaction of degeneration is absent. If organic disease is present it affords its own signs. The tenderness, increased by movement, may indicate inflammation of the muscle. Deeper tenderness may signify separation of the spinous processes or injury of the intervertebral ligaments, causing great pain when the patient drops his weight upon his heels. The pain may prevent sleep. In severer cases the spinal disease may be unquestionable. The diagnosis can only be made out by the most careful repeated skilled examinations. The prognosis is doubtful.

The treatment consists in rest, a carefully arranged regime, counter-irritation over the spine and such symptomatic measures as may be indicated. The nervous sedatives, gelseminine, solanine, cicutine and hyoscine hydrobromates, are of immense value.

## WRITER'S CRAMP

When persons whose occupation, like the writer's, involves the persistent use of a certain group of muscles for long daily periods, continued through years, there is apt to occur in the course of time a certain singular disability which interferes with the performance of that particular set of associated movements. If the muscular exertion is severe, as in the case of brakemen, the malady will come much sooner. In these cases there is probably a subacute inflammation of the muscular tissues. In



other cases a certain degree of neuritis is present, with anesthesia of the affected areas. In still other cases the vasomotor nerves are irritated, giving rise to paresthesia of the affected parts. In either class the same muscles may be employed with impunity, in movements requiring other combinations, but when the patient attempts to perform the old task the muscles become spasmodically contracted.

The prognosis is not very good. Patients thus disabled from writing with the right hand may learn to write with the left, but the disease recurs more quickly.

The muscilonervous degeneration may be remedied by mildly faradizing the affected parts and by gentle massage with hot cod-liver oil. The digestion should be regulated also. In the vasomotor conditions veratrine will relax spasm and at the same time stimulate the muscular fiber to better nutritive conditions. In general, however, the occupation should be changed as radically as possible.

### ADIPOSIS DOLOROSA

Dercum describes this as a disease of adults with fat deposited over the body in bunches, later becoming general, with pain, anesthesia and great debility. It is not myxedema. There are no mental symptoms. The disease is attributed to degeneration of the peripheral nerves. It lasts for many years, the patient dying of debility or fatty heart.

### TETANY

The cause is unknown, no lesions of the motor tract having been detected. It has occurred in epidemics, probably imitative. It occurs with gastrointestinal maladies, during pregnancy and lactation, with myxedema and cachexia strumipriva, after exposure to cold, and was noted by the writer during a case of chronic Addison's disease. Males are more liable in childhood, females in adult life. Tailors and shoemakers are specially liable. The symptoms consist in tingling, formication, pain or numbness for some days, in the arms, symmetrical, followed by stiffness beginning in the hands and extending to the elbows, the fingers clenched, pain severe, the muscles hard. It may extend to the legs. Edema and sweating may attend. This may pass off in a few minutes, last for hours, or until sleep. Attacks occur mostly at night, and are excited by emotion. There may be severe head and back ache. In the intervals Trousseau's sign may be developed—attacks may be induced by prolonged pressure on the main nerve trunk or vessels of the affected limbs. Chvostek's

**sign** is a peculiar excitability of the facial muscles, spasms being produced **if** their trunks are lightly percussed with a hammer, or lightly stroked. **Erb's** sign is the greatly increased electric excitability of the muscles and occasionally an alteration of the electric reaction. **Hoffmann's** sign is **an** increased reaction of the sensory nerves to electric stimuli. The face, **hands** and feet may be swollen slightly. Hysteric stigmata may be **present**, also anesthetic areas, tender points of the spine, herpetic clusters, **falling** of the hair, painless ulcers, contractures of neck, back, diaphragm, **larynx**, urethra, etc. Slight fever may accompany the paroxysm. The **urine** contains phosphates and the autotoxemia is shown by indican.

The diagnosis is easy. The disease tends to spontaneous cure. The **treatment** looks to the causes and the general conditions. The spasm **gives** way promptly to a whiff of bromide of ethyl, and in a case of the **writer's** the lady carried a vial in her pocket and found the relief so sure **that** finally when she felt a paroxysm coming she would feel for the ethyl and if it was there the spasm at once subsided. This sufficiently indicates the neurotic nature of the case. The digestion always needs regulation, and genitourinary affections should be treated.

## INFANTILE CONVULSIONS

The causes of children's convulsions are, organic cerebral lesions, the neurotic temperament, emotional stress and storm, rickets, acute infections, serous inflammations, renal maladies, peripheral irritations, and debility especially resultant from gastrointestinal disease. Among the peripheral irritations those of the bowels and stomach are most important, probably outnumbering all the rest of the above list. Intestinal worms are sometimes the cause. More frequently indigestible food or fecal collections cause "fits." The convulsion begins with twitching of some muscles or deviation of the eyes and staring, local or general rigidity, gnashing of the teeth, or trismus, tetanic contractions of the extremities, the flexors especially, opisthotonos or respiratory cramp, the abdomen of boardlike hardness, the spasms tending to become clonic before they cease. Cyanosis develops from the respiratory cramp. **Foam** appears at the mouth with blood if the tongue has been bitten. The urine and feces may pass. A cry or screaming may inaugurate the spasm. The paroxysm passes off in a few moments, leaving the child drowsy, sleeping or irritable. The attacks may recur rapidly, especially when due to unwholesome food in the stomach. The diagnosis is as to the cause. Gastric convulsions leave the child relaxed. The presence of fever is significant. The prognosis depends on the diagnosis.

Spasms may be speedily quelled by chloroform inhalation. Empty the stomach at once, and the diagnosis and cure occur simultaneously. Fever calls for cold to the head. Calomel followed by salines is usually effective. The gums may need attention. Repeated convulsions require a study of the cause and its removal, and quelling the hyperexcitability by the use of cicutine and solanine. We find it impossible to specify more closely, since the conditions are so various.

## NEURASTHENIA

Neurasthenia is a state of continuous exhaustion and abnormal nervous impressibility. It resembles fatigue of body but is far more complicated. Neurasthenia destroys the balance between waste and repair. It consists essentially in fatigue of the central nervous system, checking its inhibitory influence over the various organs and structures, resulting in their increased activity and early exhaustion. The neurotic heredity is marked, and this may be developed by improper mental and physical training during childhood and adolescence. Persistent mental work without sufficient rest and recreation, especially when conjoined to sexual and other excesses, and the powers have been sustained by stimulants, are the usual antecedents. While frequent among the wealthy brain workers it is not unknown among poor laborers, in country or town. The society woman is especially prone to it—the degree of intelligence that drives a woman into the social struggle without the brains to enable her to take proper care of her health, might perhaps be ranked as a subhead under the general classification of imbecility. Neurasthenia occurs most frequently between 20 and 50, in single men and married women, in the highly developed races, such as Americans and Jews.

Exciting causes are trauma, anemia, toxemia, prolonged mental strain, overwork, excessive emotion, syphilis, gout, influenza, depression from misfortune or grief, excess in tobacco or alcohol, crises of puberty, marriage, the menopause, sexual excess, disappointed love, and quite frequently sexual starvation rather than excess when the latter is normally indulged. "Autotoxemia, from whatever source, is in my opinion the most frequent cause of neurasthenia." (Geo. F. Butler.)

Charcot considers headache, backache, gastrointestinal atony, neuromuscular weakness, cerebral depression, mental irritability and insomnia the fundamental symptoms of this disorder, the true stigmata of the neurosis. Motor disorders are muscular weakness and quick fatigue, trembling and twitching. Tenderness may be found over the spinous processes. Severe persistent pains occur, not along nerves, not increased by pressure



or amenable to antineuralgic treatment, wandering from place to place. Seats of election are the knee, elbow, ankle, wrist, calf, forearm, phalanges, with supraorbital neuralgia. Dyspnea may be caused by thoracic pain. Pressure in the head is frequently complained of.

Visual disturbances are common—photophobia, disorders of hearing, smell and taste, hyperesthetic mostly. Gastrointestinal disorders are almost invariable, nervous indigestion, atony, anorexia, flatulence, heartburn, palpitation and epigastric distress, etc. Anemia of the brain is common, with fainting an hour after meals, with hunger. Pancreatic digestion is especially defective. Hyperacidity from lactic fermentation is usual. Bile is also deficient. The heart is weak and palpitates, the pulse feeble and rapid, the feet cold, vasomotor equilibrium easily disturbed. Sexual power is weakened, more in the male. The mind is weakened and the effort of thought irksome, the temper irritable. The memory for details is poor. Even when the patient sleeps he awakes unrefreshed.

Atmospheric changes are acutely felt and arouse various symptoms. The pulse falls when the patient bends forward, for a brief time (Erben). Polyuria with increased elimination of urea and phosphates is common. The acids are increased and free lactic acid, indican, indol and skatol are present (Vigouroux). Many neurotic manifestations have been recorded, any of which may not be present in any particular case.

Remissions are usual throughout the course. The depression periods become less severe and frequent as the patient improves. Selfishness and hypochondria are apt to develop.

The diagnosis is from hysteria, dementia paralytica, cerebral syphilis, multiple neuritis, neuralgia, migraine, melancholia, idiocy, paranoia, organic gastrointestinal disease, cardiac disease and tuberculosis. Most of these may be associated with neurasthenia at some period in its course. The treatment is conducted along the lines laid down for neural malodies in general. Neurasthenics are quickly exhausted as to irritability, and their medicines should be given in minimal dosage with periods of abstinence. All habit drugs should be avoided. Sleep should be sought from vasomotor readjustors and never from hypnotics. The "nervines" are very useful, such as passiflora, cypripedin and scutellarin. Not one of the tonics can be borne in full doses and strychnine is particularly dangerous.

Bearing in mind always that the particular neurosis under consideration is largely, often, chiefly, psychologic, it is impossible to overestimate the reflex importance of rest in its salutary action upon the mind. Perfect relief from bodily fatigue works wonders in effecting general amelior-

ation, though in many cases gentle and well regulated exercise is of unquestionable value, especially in certain states and in certain stages of recovery. Released from the wearing anxieties which have finally resulted in neurasthenic conditions, the mental faculties gradually but surely regain their normal strength and elasticity, particularly if the environment is such as to inspire reawakening hope and confidence.

A new life appears to accompany the results of carefully studied and judicious treatment, and in compulsory yet grateful repose the patient soon finds that his thoughts are brighter and more cheerful, his capacity for mental enjoyment keener, and his physique markedly improved under the influence of the general recuperation. Sleep and healthy digestion, which have perhaps long been strangers to him, assume a natural phase; troubles which but lately oppressed the mind with persistent anxiety appear purely imaginary, or at least are deprived of their baneful effect, while the entire system responds favorably to the new regimen and watchful care. The records of this treatment abound in illustrations of its beneficent agency in the recovery of normal conditions. It is emphasized strongly here as of unique paramount importance, in which experience leads us to place almost implicit faith.

Hydrotherapy is an invaluable ally in dealing with neurasthenia. It has been asserted that there is probably no chronic disease in which its application contributes more largely to the betterment of the patient's condition and which renders the effect of changed environment, removal of etiologic factors, diet, electricity and medication, more pronounced and enduring.

Eminent writers have endorsed the value of hydrotherapy and balneotherapy in neurasthenia. Jolly recommends the imbibition of large quantities of water as an aid to renal and peristaltic action, its external application being valuable in those cases in which increased excitability is combined with tendency to exhaustion. One can hardly overestimate the efficiency of cold rubs, half and full baths, with friction, douches, sprays, etc., in their favorable influence upon the cutaneous tissues and upon the circulation and tone of the vessels. Krafft-Ebing asserts that "in the management of neurasthenia the water treatment is of the greatest value, because as applied preferably in institutions, it admits of all possible excitant, calming and alterative effects upon the diseased organism and its tissue change." He considers hydrotherapy important in reducing insomnia, and in pronounced neurasthenia regards it as a valuable aid in regulating cardiac activity, dilating the peripheral vessels and increasing or diminishing (as desirable) the cerebral circulation.

Various hydiatic measures may be adopted, all of them more or less efficacious, according to the conditions in which they are applied. Klemperer is authority for the assertion, amply corroborated by experience, that "in hydrotherapeutic efforts we observe quite an extraordinary and incomparable stimulation of the nervous system, which is reflected upon the various organs." Dr. William N. Draper, speaking of this procedure, remarks: "It seems to be more effective than any treatment by medicine in stimulating the nerve centers, in restoring the equilibrium of the circulation and reviving the activity of the organic functions," adding forcibly that "its best results require the appurtenances of a well-ordered establishment, where all the various methods of applying water can be wisely and skillfully directed."

Many like testimonials might be adduced to show that in the water treatment a veritable means of restoration resides. "Who can calculate", says Dr. Frederick Peterson, "to what degree we may thus influence the biochemical processes of the body, the metabolism of tissues, the carrying off of degenerated and toxic substances, or determine how much we may affect the vascular neuroses, the local anemias and hyperemias of the brain and spinal cord?"

With regard to electricity, especially the static form, its use is generally conceded to the treatment of local neurasthenic symptoms—such as morbid cephalic sensations, extreme intestinal atony, weakness of the sexual organs, etc. In these conditions both faradism and galvanism, combined or alternated, have proved beneficial. Much depends upon the competent application of this subtle force—so far as experiment has shown its curative property in certain cases seems undeniable, while as a therapeutic agent in obstinate neuroses it is inferior to rest and hydrotherapy.

One of the commonest and most disastrous prescriptions given to the neurasthenic is, as Bremer remarks: "Take plenty of fresh air and exercise." The "fresh" part of the injunction is all right (in some sanitariums such patients are often compelled to be in the open air all day, even though in bed, and when too weak to move about or sit up), but the prescription of "exercise" is all wrong. There is a widespread delusion that exercise is beneficial under all circumstances. The acme is reached when the gymnasium and athletics are recommended to all neurasthenics. Many athletes and prize fighters become neurasthenics by dint of too much muscular exercise. Even in laboring men who have heavy work to perform, nervous prostration often results. Whenever and as often as a muscle is contracted, certain brain cells enter into activity. The brain in one or more of its parts is, in neurasthenics,



easiest irritated and exhausted. Owing to the close functional dependence and interdependence of all parts of the brain, work of the motor region governing muscle contraction during exercise must redound on other weakened and easily irritable parts. Some cerebrasthenics whose slightest mental effort is followed by brain-fag can walk long distances without feeling any fatigue, but this is often an expression of over-fatigue.

Dietetics are also badly abused. Neurasthenics are often advised to eat plenty of nourishing food; and gorge themselves without considering that, as Brewer remarks, it is not the amount of nutriment, even when properly digested and absorbed, which determines nutrition, but the use to which the digested food can be put in the tissues. The artificial foods have the effect of weakening the stomach by rendering it, so to speak, apathetic, thus interfering with the churning of the food and the secretion of gastric juice. An ounce of butter and bread digested naturally outweighs a pound of beef incorporated in the system under artificial conditions. Beef extracts are especially objectionable in neurasthenics. Milk and fresh fruit often disagree with these patients. Dietetics, therefore, should be a matter of individual prescription, rather than any unvarying directions. Excess of the proteids and excess of the starches and sugars are equally to be avoided as the two excesses acting in a vicious circle aggravate each other. Starchy food fermenting in the intestine causes absorption of proteid products of decomposition.

The general principles of treatment consist in educating the patient to live within his nerve income, which is small. The man of average strength cannot with impunity attempt to perform the muscular feats of an athlete or prize fighter. Likewise, the neurasthenic cannot do what many of his acquaintances do. He must forego a great many pleasures; abstain from many pastimes and entertainments; refrain from many articles of food which to him seem simple, natural and healthful, but nevertheless, stand in the way of his recovery. He must above all learn his limits. His treatment must be a sort of education, teaching him to be patient and temperate in all things. He must learn to adapt himself to his surroundings, to reestablish the lost normal equilibrium between him as an individual and his environment. To mitigate is now to prevent the collapse which constitutes such a discouraging feature in the course and progress of neurasthenia, discouraging alike to patient and the family.

To achieve this end the patient must be taught to avoid extremes, especially of emotion and work, mental or physical; in short, bodily and mental hygiene adapted to his individuality must be instituted. No rest-cure, no sea-side, gymnastics, cold or warm water; in fact, no par-

ticular method is equally applicable to all cases; and drugs alone will not bring about restoration to health.

During the whole course of the treatment the patient should be under the control of a physician and during treatment should be severed from the environment in which the disorder has grown up. He should receive only the diet, hydrotherapy, balneotherapy and drug treatment indicated in his particular case. The great results formerly attained at watering places were due to the partial application of these principles and to the medical control exercised. No rest cure is properly carried out where these principles are neglected. Rest cures under lay control, whether of trained nurses or otherwise, are simply quackish lounging places. That the training of a widely advertised system of rest cure is eminently deficient, is shown in the fact that nurses trained under this system never detected the untoward actions of drugs used in treatment until decades after their existence had been pointed out by neurologists.

In conclusion it may be stated in general terms that the malady now recognized as neurasthenia, complex as are its various manifestations and often obscure its etiology, is more amenable to successful treatment than is commonly supposed. We have indicated the prominent features to be considered, together with the means of alleviation and cure proved by actual test to be most efficient. No victim of the wide-spread malady should despair, or imagine that his case, however aggravated, may not yield to intelligent care and the employment of methods whose records augur the happiest results.

## V. VASOMOTOR AND TROPHIC DISORDERS

### ANGIONEUROTIC EDEMA

This malady is also known as Quincke's disease, giant urticaria, and by at least six other titles. It is characterized by one or more acute circumscribed edemas in localities containing loose webs of connective, such as the eyelids, ear lobes, lips, prepuce, neck and wrists.

There may be a period of general malaise or digestive disturbance, or the attack may be unheralded. The swelling develops within a very few moments, rarely occupying some hours. It is apt to be sharply defined, quite large, attacking but one locality as a rule. The skin may be pale or congested. It does not readily pit on pressure. The regions affected in Collins' 71 cases were, the face 29, extremities 22, trunk 6, larynx 5, genitals 3, stomach 3, palate, neck and mastoid 1 each

The swelling may subside as quickly, or in a few hours, or not for some days. Others may appear and prolong the duration. Periodic recurrences are common, at the same or other points. Stiffness, burning, itching or numbness may attend, or ordinary urticaria may coexist.

There is no special implication of sex or age. The malady is hereditary. Digestive disturbances excite attacks. It replaced malaria for a patient of Matas. Traumatisms and exposure to drafts seem to have induced attacks but the dependence of the malady on intestinal toxemia seems clear. As with ordinary urticaria, overheating and stimulant beverages excite attacks. Wende found in his cases albuminuria and hemoglobinuria.

The disease is a local vasomotor neurosis, the exciting cause acting on the nervous centers. Lodor attributes it to a rapid rise of lymph pressure in areas of low resistance, causing sudden and rapid vasomotor paralysis there.

The diagnosis is made by the sudden development, absence of pitting, quick subsidence, heredity, liability to urticaria, and presence of toxemia. The malady is annoying but not dangerous unless it attacks the glottis. Recurrence will depend much on the recognition of the exciting cause and the patient's willingness to avoid it.

The bowels should be cleaned by a mild cholagog such as euonymin, gr. 1 to 5, followed by saline laxatives, and quickly disinfected by sodium sulphocarbolate, about two scruples a day. Renal elimination must be sustained. Generally an evening dose of veratrine, gr. 3-134, well diluted, will be of great benefit. A sweat by pilocarpine quickly gives relief if the itching is intense. Copper arsenite in small doses, gr. 1-250 every 2 hours, is useful if there is acidity or jaundice. The patient must avoid the foods that excite attacks and keep his bowels free and aseptic.

Intermittent dropsical effusions into the joints have been described, the knee being most frequently affected. The cause and pathology are conjectural as yet, but as it occurs in neurotics it is attributed to nervous perturbations. The affected joint suddenly swells, without other evidences of inflammation, and in three to eight days subsides. Recurrences at regular intervals of one to four weeks may continue for years. The prognosis is doubtful, the malady being obstinate. There has been no distinctively beneficial treatment as yet fitted to the disease.

### RAYNAUD'S DISEASE

This designates a persistent vasomotor spasm affecting the extremities symmetrically. It is probably centric but no such lesions have been



detected as the symptoms would indicate. Peripheral neuritis and endarteritis have been found in some cases. It is a disease of women and children rather than of men. The neurotic state generally underlies it. The malady is aggravated by cold.

The anemic stage presents local spasm of the vessels of a finger, or several, which become white or livid, cold, firm, dry or moist, and anesthetic. After a time, depending largely on the temperature to which the affected parts are exposed, this subsides, leaving a sense of tingling like that of parts that have been frosted and are thawing. In the stage of asphyxia the parts are cyanotic and swollen, with venous congestion. This may affect the ears, nose and toes, and is more liable to recur than the preceding, on slight provocation. It recurs also in the same parts. Hemoglobinuria often accompanies this form, especially in children. In other cases there is an excess of urates. Evidences of these attacks remain in transverse ridges on the nail at the point that was in the matrix at the time. But when the spasm endures too long and is sufficient to choke off the nutrient blood, gangrene results. Black spots or vesicles appear about the end of the finger, and slough off leaving a sluggish ulcer. In severe cases the terminal phalanges or other affected parts may be lost. Such cases affect other parts also, such as the breasts, where small patches of the skin die. The severer forms are accompanied by pains similar to those of senile gangrene—or a shoe too tight at the instep. Sometimes glycosuria accompanies, but this complicates the diagnosis.

“A neurosis characterized by enormous exaggeration of the excitomotor energy of the gray parts of the spinal cord that control the vasomotor innervation,” was Raynaud's definition. Later writers insist on gangrene as justifying a diagnosis, slight and superficial, as well as symmetric. Syringomyelia, leprosy, diabetes and hysteria are to be excluded.

The prognosis is good, except in marasmic children. The paroxysms tend to cease in time. The treatment of the paroxysms consists in the application of heat, with vasomotor relaxants, such as glonoin, and atropine to restore warmth to the surface. Massage with various forms of electricity have been lauded. A full dose of pilocarpine has given prompt relief. This is especially advisable when the pains indicate strangulation and approaching gangrene. During the intervals any derangement found in the general health should receive attention, the digestion especially; the affected parts should be protected against cold, and given abundance of non-fatiguing exercise. The continuous influence of atropine has proved of great value in the writer's cases. The

vasomotor condition present in late pregnancy being exactly opposed to that in this malady, the writer has advised marriage and pregnancy in two cases of Raynaud's disease, and the result has in both cases justified the advice. To sustain vasomotor relaxation veratrine would seem to be the remedy indicated, but in every case that has come to the writer there has been a feebleness of pulse that contraindicated full depressive doses. Possibly the less powerful relaxants, gelseminine or cicutine hydrobromate, would meet the need; in fact, in one case the latter proved of unmistakable benefit.

### FACIAL HEMIATROPHY, PROGRESSIVE

Quite rarely cases have been observed in which half the face is atrophied, the process stopping at the exact middle line. Skin, muscles and bone may be involved. Chronic interstitial trifacial neuritis has been found in some cases, disease of the Gasserian ganglion in others, while inflammations of the cervical sympathetic and of the trigeminus have been observed in others. The fat is absorbed, the skin atrophies, pigment is often deposited, and the vessels are enlarged.

The cause is unknown. The disease commences early in life, complicating other neurotic manifestations. It has been observed with neuralgias, migraines, epilepsy, mental disorders, convulsive tic and chorea if the latter affects the jaw and tongue; and with ataxia and multiple sclerosis. It has followed traumatisms and acute infections. Cases are more severe the earlier in life they begin.

The skin flattens on the affected side, if progressive the muscles and bones are involved, white or pigmented areas appear, depressed, along the courses of nerve trunks; the hair becomes thin, dry and scanty, the sebum scanty and the skin dry. Flushing and dilatation of the pupil are rarer. The non-atrophic side alone reddens when blushing occurs. Sensation is not affected as a rule but sometimes electric and tactile sense is lessened. Taste is not affected even if the tongue is atrophied.

The only affection mistakable for this is congenital asymmetry, and here the skin is not perceptibly altered in texture or secretion.

The prognosis is bad as to cure, but the malady does not affect longevity. No satisfactory treatment has yet been devised.

Facial hemihypertrophy is very rare; congenital; the soft parts are enlarged; secretion increased; no etiology, pathology or treatment known.

### DIFFUSE SCLERODERMA

A circumscribed or symmetric induration of the skin, in spots, streaks, bands or patches, often accompanied by telangiectases.

The symmetric form develops slowly or acutely, with rheumatoid prodromes, or paresthesia, muscular cramps or neuric sensations. Vesicles, blebs, scales, local sweating or anesthesia may precede the induration. This affects the upper parts of the body chiefly, as an induration or firm edema, only at first pitting. The skin is tense, shining, smooth, waxy, or dirty-yellowish. The limits are ill-defined. It may rapidly or slowly involve much of the skin; the face is a mask, the lips open with difficulty, the eyelids are less affected, and respiration may be impeded. The abdomen is not often affected. At times the course is so slow that years may be occupied in covering the body. The patient may be quite helpless. There may also appear subcutaneous tubercles, eczema, erysipelas, canities, anidrosis, zoster or acne. The mouth and vulva may be alone affected. G. F. Butler saw a woman whose entire face, chest and breasts were affected.

In the later stages the affected areas become indurated and contracted, the skin is thin and tightly drawn, dry, scaly, fissured or ulcerated, facial wrinkles disappear, the muscles atrophy, teeth fall, contractures form, and various pains and other symptoms of degeneration occur. Gastrointestinal ailments cause marasmus, or the case ends with renal, cardiac or pulmonary intercurrents.

Pigmentary changes are common, some patches dark and others white. Forcible movement of affected parts causes pain, and the skin gives way. The surface is cool, and very sensitive to cold. In time the bones atrophy, or exostoses form.

While there is some faint resemblance to Addison's disease, and to Raynaud's, diagnosis is easy. The prognosis is doubtful but some have recovered.

Morphœa or circumscribed scleroderma occurs in small areas corresponding to the distribution of nerves; firm, smooth patches, points, lines or bands, slightly elevated or depressed, surrounded by a delicate violaceous halo, followed by atrophy. The halo precedes the induration, which develops in the center of the patch, and assumes the hue of old ivory. The patch is rarely larger than a dinner plate. Later the skin atrophies. The patch may be dotted with pigment or open mouths of sebaceous follicles. Few subjective symptoms are present—sometimes itching or other paresthesia. The spots may be pigmented or show a netting of fine dilated capillaries.

Tension may be relieved by moist heat and massage. The general principles of hygiene and drug treatment are applicable. As a remedy that has proved of value in other instances where centric nervous disease has had cutaneous manifestations, zinc phosphide deserves a full tri-



### AINHUM

This malady affects the toes, especially the little ones, of dark skinned races. A narrow groove appears on the inner plantar surface on one or both feet, and gradually encircles the toe. As it deepens the toe swells, but with little pain. It may take years for the toe to be thus amputated. All the toes may thus be shed. The disease affects men, rarely women or children. The tissues of the affected toe degenerate, the bone being absorbed. The cause is unknown. Heredity has been affirmed. Manson thinks it begins with a wound and is kept up by constant irritation.

No treatment has been devised excepting amputation of the toe.

The malady prevails in India, Syria, the west coast of Africa, Brazil, and possibly other parts of the tropics.

### ERYTHROMELALGIA

Weir Mitchell described this disease as characterized by paresthesia, redness and pain, usually in the toes and heels, with general disturbance. While arteriosclerosis in the affected limbs has been detected the disease seems due to vasomotor disturbance. Cold excites it, rheumatism and the neurotic state predisposing. Young men are most frequently the victims.

Pains begin in the feet, with redness and swelling, the tenderness preventing walking. Headache, dizziness and syncope with palpitation may attend. It is most frequent in summer and is aggravated by heat and by standing. Diagnosis is not easy as it resembles inflammation. Hemiplegia or organic spinal disease may be present. The prognosis is good but recurrences are frequent.

The attack may be at once cut short by plunging the feet into cold water. Massage, faradism, galvanism, hydrotherapy, and measures to improve the general health and the nervous resistance, are appropriate. Care should be taken to see that the feet are properly shod. Many a corn has been treated as a serious or general malady.

### ACROPARESTHESIA

A disease displaying abnormal sensations in the hands, slight vasomotor disturbances, and slight stiffness of the fingers. It sometimes follows injury, or such exposure to cold and wet as laundresses endure. It affects mostly grown women.

Formication and tingling or numbness affect the fingers of one or both hands, developing suddenly. The toes are sometimes affected. The pain is worse at night and in early morning, and on exposure to heat. The parts may be cyanotic and cold, or pink and warm; hyperesthetic or anesthetic; or stiffened. Slight trophic changes may follow. The attacks last a few minutes, or hours, recur frequently or at long intervals. The tender toes following typhoid may be a form of this malady.

Diagnosis is easy; distinguishing ataxy, tetany, hysteria and Raynaud's disease. The prognosis is good. Alkaline lotions quickly relieve the tender toes, and possibly the fingers. Change of occupation is advisable for laundresses. Faradism, with such remedies as the general condition warrants and tonics are recommended. The digestion should be regulated.

### MERALGIA PARESTHETICA

Bernhardt's disturbance of sensation consists of paresthesia and abnormal sensation on the outer aspect of the thigh, in the area supplied by the external cutaneous femoral nerve. Chronic interstitial neuritis is sometimes present. The malady has been attributed to injury, overexertion, infections; predisposing causes are found in alcoholism, constipation and pregnancy; cold douches seem to have aroused it; heredity is claimed.

We may find burning, tingling or stabbing pains, a sense of cold and numbness, slight paresthesia or total anesthesia. Pain, temperature and electric sensibility are more affected than other forms of tactile sense. Both sides may be involved. A tender spot may be found inside the anterior superior spine of the ilium.

Diagnosis is easy, prognosis doubtful. The general condition should be treated, the digestion regulated, various forms of electricity applied, and zinc phosphide given a full trial.

### GENERAL CONSIDERATIONS ON TREATMENT

This chapter will relieve us of the need of dilating on the treatment of each malady except as specific remedies may have been developed for it.

The reader of this section will have noted several peculiarities: The maladies described are often rare, many are known by the names of their discoverers, their causes are obscure, their diagnosis carefully differentiated, the prognoses universally bad, the treatment uncertain and undeveloped.

The inference to be drawn is that they became known during a period when it was the highest ambition of the investigator to recognize a set of associated symptoms to which his own name might be attached, and thus be carried to future generations. This required accurate diagnosis, some attempt to elucidate the pathology, but not by any means the development of successful treatment.

It would be well, if this strict limitation of the ambitions of our confreres is recognized, to commence attaching the name of the successful deviser of curative treatment to that of the discoverer of the disease, and thus stimulate the search for useful knowledge. But these maladies are not entities, and specifics for disease-names are impossible. We must therefore fall back for treatment upon the fundamental principles of therapeutics and leave to the individual practitioner the task of fitting the particular applications to the particular cases before him.

The extent to which fecal and other forms of autotoxemia are responsible for the causation of disease is as yet far from being determined. We cannot assign it as a cause of the maladies in question more than as a suggestion, for consideration and observation; but we may assuredly assume that under no circumstances can the retention and decomposition of the bowel contents be regarded as beneficial, or indeed as a matter of indifference. Let us commence our treatment, then, by thoroughly emptying the alimentary canal, disinfecting it, and keeping it clear and clean throughout the course of the attack.

This may be accomplished by administering calomel gr.  $\frac{1}{2}$  every half hour for six doses—if the stools are light colored and offensive—followed by enough effervescent saline laxative to produce copious watery stools, aided if necessary by colonic flushes. If the stools are dark and offensive, instead of calomel give podophyllotoxin, gr. 1-12 every half hour. If the stools are not offensive the saline alone may suffice, but as a rule the calomel is advisable. Once completely emptied the bowels must be kept clear by similar means, a morning dose of the saline usually sufficing, aided by an evening grain of calomel occasionally, perhaps once a week throughout the duration of the malady.

Disinfection is best attained, after thorough cleaning out, by the use of the sulphocarbolates. If the bowels are infected or diarrhea is present, give zinc sulphocarbolate one to five grains every one to four hours, lessening the doses after the stools become odorless to just enough to maintain this effect. If acidity is present, or the stomach is irritable to the zinc, substitute the soda salt in similar doses or double those of the zinc. But if there is need of tissue reconstruction use the calcium sulphocarbolate, also in double the dose of the zinc. In most cases



the combination of all three, with bismuth salicylate, is preferable, as being non-irritating, and the bismuth offers a ready mode of testing the antiseptics, as it no longer blackens the stools when sulphides are not formed by decomposition of fecal matter.

The same considerations apply, word for word, to deficiencies in the work of the eliminant organs. The retention in the blood of substances that should have been excreted by the kidneys, liver, lungs and the skin, cannot but exert an injurious influence on tissues already weakened by disease, and which require for the restoration of health a full supply of the best and purest nourishment instead of being further debilitated by saturation with toxins. The estimation of the work done and that left undone by each of the great eliminant organs is an imperative preliminary in the study of all these maladies.

The way is thus cleared for a study of the patient's nutrition and the application to the case not only of the rules of diet but those of personal hygiene in general. The success of the physician will largely depend on his knowledge of these rules and their practical application to each of his cases. We could scarcely forgive the negligence of the physician who would leave his patient to poison his blood by inhaling the exhalations from decomposing organic matter in his cellar, any more than we would if he left him to absorb toxins from his bowels.

Certain measures will be found to be advocated by all who have given special study to this group of diseases. We refer to massage, hydrotherapy, graduated exercises, the applications of heat and cold and the various forms of electricity. These measures are purely empiric, none of them being applied to known pathologic conditions because of the known effects these agents have in counteracting those conditions. The value of these agents, however, has in a number of instances been sufficiently proved, and as methods of exercise and of combating muscular degeneration they are too valuable to be neglected. A little of value may be found in various special works as to the selection from among these means, of special applications to particular instances, but there are few exceptions to the general rule that each new case demands separate experimentation before the best applications in this particular instance can be determined.

The ignorance of the profession as to the application of drugs in this class of diseases is due to the universal neglect of applied therapeutics, and the consequent lack of accurate information as to the effects of drugs upon the healthy and diseased bodily functions. There is but little therefore that we can suggest today, beyond indicating the lines along which clinical experimentation may advantageously be pressed.

The diet should be arranged with the utmost precision. A due supply of each of the essential elements of a perfect diet should be secured, proteids, carbohydrates, fats, salts, and water being duly provided. Fetor of the stools indicates restriction of the proteids, flatulence with other evidences of starch indigestion demands limitation of carbohydrates; fatty acids in stools or vomit the discontinuance of free fats. Gastric indigestion demands hydrochloric acid, intestinal debility diastase, and the active principles of bile and of the pancreatic secretion are needed far more generally than is comprehended. Either of these digestants initiates its digestive process, and as the secretion is automatic, the secretory glands will complete their task if the food is suitable in nature and form, and not excessive in quantity. In general there is innutrition, and the indication is for small quantities of easily digested but nutritious food, always warm, to be thoroughly masticated and insalivated, and repeated every four hours. All iced drinks and foods richly seasoned, condiments, alcohol, and usually all caffeine-bearing beverages, are to be interdicted. Milk, eggs, fish, oysters, fresh fruit juices and simple carbohydrates like rice and the modern partly digested breakfast foods, are usually preferable. Allow for due variety. Sometimes the need for thorough mastication is only met by the use of hardtack, or oatmeal scones. Milk should be taken warm. Clam broth and chowder, and turtle soup, are easily digested and nutritious, readily assimilated and well suited for weak digestions and low nutrition. Chicken and turkey, sweetbreads, brains, all game except water fowl, and even beef, are useful also, but probably more cases occur where the system is poisoned with an excess of proteids, undigested, than from a deficiency in these articles. A daily supply of raw fruit juices containing the still living elements of plant life is advisable; and when milk can be had warm from the cow it is preferable. Individual preferences and appetites are always to be considered.

The digestive forces may be reinforced somewhat by local feeding. The colon may be utilized for the absorption of foods after it has been cleansed, throwing about eight ounces of semiliquid food, with artificial digestants, into it twice a day. The vagina absorbs foods and medicines better. The skin absorbs fats, and rubbing with hot cod-liver oil has afforded valuable assistance in treating many debilitated conditions.

Hot brine baths and rubbing with towels dipped in salt water and dried are useful measures to attract the blood to the surface where it may be oxidized. These may be repeated daily, before the patient lies down to sleep.

Much may be done in the way of preventing paroxysmal attacks by attention to the details of personal hygiene—dressing in wool next the skin, and hardening by the daily application of cold water to the skin, by prescribed exercise, and the avoidance of exciting causes. Anstie insisted that a neuralgic required more food than others, and that a layer of fat beneath the skin protected the nerves.

Especially imperative is it to ascertain the quantity of solids excreted daily by the kidneys. If this falls constantly far below the normal quantity efforts should be made to raise elimination. If the vascular tension is not too low the best remedy here is veratrine, gr. 1-134 three to seven or more times a day, or three times this dose at bedtime. All nitrates and nitrites seem to stimulate the excretion of urinary solids, sodium nitrite being especially active, and these may be employed when veratrine is irritating to the stomach. Sodium nitrite may be given in doses of gr.  $\frac{1}{4}$  every two to four hours. Colchicine, gr. 1-134 increased to slight irritation of the stomach and bowels and then given in doses just below the irritative point, is useful for the gouty and plethoric. The writer has obtained excellent results in this particular from a combination of phenocoll and piperazin, with abundance of water.

Even more directly indicated is the use of boldine, by which the production of urea by the liver is stimulated. Of the granules containing a milligram each, seven daily form an average adult dose. Since urea is the natural diuretic of the body its production seems in the line of true "physiologic" therapeutics.

The special effect of arsenic is probably the production of fatty degeneration. During convalescence from acute infectious diseases, such as pneumonia or rheumatism, it seems most probable that arsenic will favor the process by which the debris of these diseases is melted down and carried out of the system, instead of being allowed to remain as a clog to the vital functions and a menace to the future health. Whenever a similar indication arises in any malady, the use of arsenic is justifiable; beyond this it does not seem applicable excepting when required to combat certain infections, such as that of malaria, and of an as yet undiscovered cause of pernicious anemia. Give small frequent doses till the eyelids itch, then keep just below this point for a month.

The remarkable effects following the use of zinc phosphide as a remedy for zoster induced the writer to present the following proposition—that wherever a centric nervous degeneration is indicated by local cutaneous manifestations zinc phosphide, by improving the nutrition of the diseased centers, will act as a prompt and effective remedy for the disease. A number of applications of this remedy have confirmed



the correctness of this proposition. There is room for wide experimentation, however, before the limits of its applicability will be established; and the group of diseases now under consideration offers many opportunities for such tests. Recognizing the tremendous metabolic power of this drug, and the possibility of harm resulting from its continuous administration, it is our custom to advise zinc phosphide to be given gr.  $\frac{1}{4}$  four times a day, for one week out of each month, the remainder of the month being supplied by the use of neuro-lecithin, another agent whose power of improving the nutrition of undeveloped or degenerated tissues is attracting attention. Whether the influence of these remedies is confined to nervous degenerations or is also applicable to similar lesions of muscular fiber, remains to be determined.

It is now fully established that the administration of nuclein increases the number and activity of the phagocytes, but the exact bearing of this observation upon clinical practice remains to be ascertained. There is a mass of testimony, however, as to the value of this remedy in all diseases depending upon invading microorganisms, animal or vegetable, verifying the views of Metschnikoff and Vaughan. Nuclein should therefore be administered in full doses in every case believed to be due to such causes. Of the standard solution a dram each 24 hours is the full dose; beyond this the leucocytes quickly diminish in number.

Another set of observations has shown that in the sulphides we possess remedies powerfully destructive to invading microorganisms and yet harmless to the human body. The sulphides of calcium and of arsenic, if administered until the body is so saturated that the odor of these drugs is exhaled with the breath and the perspiration, are believed to render the body for the time uninhabitable by any pathogenic organism. In a number of infectious diseases this has been well proven; in none has it been disproven. The principle is applicable in all infections. Give calcium sulphide 5 to 40 grains a day; arsenic sulphide gr. 7-67 a day. Saturation is denoted by exhalation of sulphureted hydrogen by the skin.

Three remedies are known to exert specific effects upon muscular fiber, namely, quinine, caffeine and veratrine. The local effect of dilute solutions of either, injected into the substance of diseased muscle, seems a legitimate subject for study. Possibly some of the constituents of healthy muscular fiber, thus administered, might prove a valuable reinforcement to the waning powers of the diseased part. The beneficial effects obtained by applying nutritives, such as raw blood and egg albumen, to the surface of sluggish ulcers, seems to warrant this suggestion.

Excepting to combat anemia there seems to be no good indication for the use of iron. That universal stimulant, strychnine, by arousing the reserved powers of the system may produce some temporary apparent improvement. The other so-called tonics are useful if they are indicated; but the rash administration of powerful tonic mixtures, without any special reason for the choice of any one of them, or of the whole, excepting that the patient is weak, is a therapeutic method well calculated to bring the art into contempt. Too often these remedies are employed to increase the appetite, while the bowels are clogged and the kidneys failing from over-work. Iron is best given in the drinking water, and the addition of nuclein solution enables the body to appropriate and retain iron that would otherwise pass through and be lost.

Hemorrhages are best met by the quick application of atropine, which dilates the cutaneous capillaries and abstracts the blood from the bleeding points. Give a full dose, gr. 1-67, hypodermically, and repeat in half an hour if necessary. The vascular tension should be restrained by full doses of veratrine, gr. 3-67 at once, hypodermically, repeated as needed, and by quickly lessening the bulk of the blood by venesection, or depleting enemas of saturated salt solution, cold, thrown into the bowel. The bowels should usually be quickly moved by elaterin, gr. 1-12 every hour. Fever may be restrained by the defer-vescents, veratrine, aconitine and especially gelseminine, either of which should be given in small doses rapidly pushed to full effect. Of gelseminine give gr. 1-250 every ten to thirty minutes till the eyelids droop. The simultaneous or subsequent administration of the heart tonics, digitalin or cactin, or the vital incitant strychnine, may be indicated. Give dose enough—it is not desirable to fetter the practitioner by too close advice as to dosage when cases require such various quantities.

Many times the influence of absorption stimulants will be required, to remove the debris of hemorrhages and inflammations. We have long employed the following and come to look upon it as the most effective agent of this nature in our experience: Mercury biniodide gr. 3-67, arsenic iodide gr. 1-67, iodoform and phytolaccin or stillingin gr.  $\frac{1}{2}$  each; all to be given four to seven times a day, stopping and reducing the dose whenever the eyelids begin to be irritated, but continuing till the need no longer exists. In syphilis nothing so quickly puts a stop to the destruction of nerve tissues; in this and other maladies nothing so powerfully stimulates absorption. The mercury is the most powerful of antisyphilitics and absorbents; iodine aids in both and renders mercury more prompt, besides carrying it out of the system c

tainly; arsenic iodide is the most active of iodine preparations, and by irritating the eyes makes them a safety valve, affording the plainest indication of the beginning of toxic action and the necessity of diminishing the doses; iodoform aids the iodine effect and subdues any gastric irritation caused by the other ingredients. The use of the vegetable absorbents is based on theoretic grounds which may or may not be true. They are added with the idea that by stimulating the lymphatics they may carry off the debris and leave to the mercury and iodine the duty of combating specific infection; besides, experience has indicated that they add efficacy to the combination. The whole combination, in quickness of action and efficacy, far exceeds potassium iodide, alone or with corrosive sublimate.

Counter-irritation is often of value. The most decided benefit is obtained from the actual cautery or moxæ, but few patients will care to bear the pain. The application of lunar caustic to the skin in narrow lines is probably the best, as the effects are far more decided and penetrate deeper than those of blisters. The resultant dry eschar does not interfere with subsequent applications so much, or constitute a source of discomfort or infection.

Acetanilid is useful to quell painful attacks in robust individuals, severe, with or without fever; giving gr. 1 to 5, guarded with caffeine and accompanied with soda, three doses an hour apart. If this does not afford relief, other remedies are preferable.

Antipyrin succeeds best in the lightning pains of ataxia, and is less depressing than acetanilid—and less effective.

Atropine is a powerful remedy for sciatica, lumbar neuralgia, uterine pains, spinal irritation, dysmenorrhea, ovarian and intercostal pains, and for tic douloureux. It is the great remedy for spasm, and more pain is due to spasm than to all other conditions combined. When the cutaneous capillaries are spasmodic, the skin shrunken and cold, the pulse suppressed and tense, atropine will return the blood to the skin and relieve the internal hyperemia. Give to an adult gr. 1-500 in hot water every fifteen to thirty minutes till the skin reddens slightly and the mouth is dry; if relief has not then been secured this is not the remedy required—but there are few cases that will resist the king of spasmodic pain. A dose of gr. 1-100 injected close to the affected nerve will frequently conquer the most stubborn attack. It will not remove hyperplastic tissues compressing a nerve trunk.

Aconitine is indicated by a hard, wiry pulse, throbbing headache, evident displacement of blood suspending circulatory equilibrium; forms of neuralgia due to catching cold or checking discharges. Of



amorphous aconitine give gr. 1-134 in hot water every five to twenty minutes until there is enough effect on the pulse to show full physiologic action; then less frequently. With quinine arsenate aconitine is useful in periodic attacks.

Bebeerine has been recommended as a remedy for periodic cases, but this alkaloid having unfortunately acquired reputé as a substitute for quinine it has never been investigated with a view to establish the difference in their powers. Bebeerine however is more astringent to relaxed connective tissues than is quinine, standing between the latter and berberine. This would indicate its value in relaxed conditions and during convalescence. The tonic dose is about a grain before meals.

Brucine has been advised in hysteric cases, in intercostal neuralgias, and for nervous erethism. This alkaloid possesses marked local anesthetic powers and is usefully combined with cocaine when the latter does not work well. Otherwise brucine resembles strychnine. The dose is about gr. 1-67 every five minutes till evidences of tonic action are manifest. Locally a 2 1-2 per cent solution may be employed with equal parts of similar cocaine solutions, as an anesthetic.

Caffeine has also been injected along the course of painful nerves, with asserted local anesthetic action, but does not equal brucine. Caffeine is useful internally for sciatica and other deep-seated neuralgias, and for affections of the brachial and cervical plexuses when injected. The dose for hypodermic administration is from one to five grains, made soluble by the addition of sodium salicylate. Both must be chemically pure—the salicylate if impure or contaminated will make the solution pink or even black. The solution may be made by dissolving 35 grains of sodium salicylate and 40 grains of caffeine in distilled water to make two drams. This gives a grain of caffeine to three minims or drops. Care must be taken to instantly wash out the needle of the syringe after injecting as this solution quickly clogs the small aperture.

For internal use caffeine valerianate may be given in doses of gr. 1-6 every few minutes. Other salts do well in hot water; small doses.

Cannabis is useful for neuralgic headaches and in visceral pains. The dose of a good extract is gr. 1-6 every half to one hour till effect, or till disturbance of the sense of time or space indicates toxic action. The want of a reliable and uniform preparation of this curious drug has hindered its use. The true remedial principle in it has not been isolated.

Capsicin is useful in cases developing after the patient has ceased the habitual use of alcohol or morphine; and when the vital depression extends to the stomach and absorption is stopped. A small dose—gr. 1-67 to 1-15—may be added to other remedies given by the mouth.

Arsenic is effective as a means of breaking up neuralgic sequences, malarial and otherwise; for angina pectoris, and in the neuralgias of frigid, anemic, amenorrheic women. Small doses should be given of the preparation selected, continued for several weeks. In angina pectoris the writer prefers arsenic iodide, gr. 1-67 four times a day, continued for a year if necessary.

Cocaine gives relief in cases due to overwork, mental strain, anxiety, apprehension, grief or other overmastering emotion, and in those stopping narcotic habits. It is a dangerous remedy, especially to the neurotic, and the patient should never be permitted to know that he is taking this drug. Disguise it effectually; and in most cases replace it with caffeine or brucine. The dose is gr. 1-6 by the stomach, repeated hourly to effect for the paroxysms.

Colchicine has a wider field than is generally believed. It is the remedy for the plethoric and the uricacidemic, for attacks following indulgence at the table (post-Thanksgiving headaches), or from catching cold; and whenever there is marked throbbing of the head. The acme of a migraine usually presents this indication. The dose is gr. 1-134 to 1-30, in hot water to hasten its phenomenally slow action, and repeated in two hours if necessary. This drug is best given in a single full dose when we have learned the patient's reaction toward it.

The phosphate of copper is said to possess a specific power in relieving pains in the fifth nerve. This has also been claimed for aconitine, and for gelseminine. The differentiation has not been cleared up, and seems doubtful. Luton suggested this salt as a remedy for tuberculosis, and it may prove specifically valuable in the neuralgias of these cases. The dose is gr. 1-6 every two hours for nine doses a day.

Croton chloral relieves pain in the scalp; it has given most satisfaction in relieving the tenderness remaining after the subsidence of a neuralgia of this region. The dose is a grain every hour till relief.

Cypripedin and scutellarin are mild but efficient nervous sedatives, or rather calmants. They are useful for the depression attending nervous attacks. An attempt at differentiation has been made by assigning scutellarin to cases where the pupils are dilated and cypripedin to those showing contraction. The dose of either is from gr. 1-6 to 1 in hot water every hour.

There is no place in the treatment of neuralgia, a malady of depression, for any of the bromides unless it be camphor monobromide. This may be employed in doses of a grain every half-hour during the early evening, to secure sleep in prolonged attacks or after their subsidence.

Delphinine has been advised in obstinate facial and cervical forms. It combats vasomotor spasm and any irritation or excitement in the genital sphere, and may be employed in such cases. The dose is gr. 1-67 hourly.

Digitalin has been advised in sciatica and in aural neuroses. Its administration should be regulated by the tension of the pulse.

Emetine may be given to relieve the stomach of a fermenting mass and to stimulate the liver—a grain at bedtime. Sometimes the physician who has been vainly administering direct analgesics is mortified when an emetic reveals and removes the cause of the suffering.

Ergotin has proved useful in obstinate gastralgia with pulsation of the abdominal aorta. It was given hypodermically in doses of gr. iij three times a week. The applications of this remedy might be amplified. As a vasomotor contractor it has been urged wherever this condition of the nerve centers exists.

Eserine has been applied with good effect for neuralgias of the eyeball; the ordinary solutions of the oculist being used.

Gelseminine subdues sexual irritability and is applicable to neuroses of this tract. It has been advised for dental pains also, with less evidence in its favor. Ovarian and testicular pains are quite certainly controlled by this agent in moderate doses—gr. 1-250 every half-hour, in hot water or hypodermically, until relief follows or the droop of the eyelids signifies the limit of its useful administration has been reached. If relief has not then been secured the condition-diagnosis has been erroneous, and other remedies are indicated.

Iodine may be employed for a syphilitic taint, or to stimulate the absorption of encumbering debris along the course of the affected nerve. The latter indication is apt to present itself in any inveterate neuralgia whether the painful points of Valleix are demonstrable or not. Massage is a useful adjuvant when exudative masses are found along such nerves as the sciatic.

Glonoin is the most active agent we possess to dilate the arteries, and acts more quickly when given by the mouth and stomach than it does hypodermically. It is indicated when the cutaneous vessels are spastically contracted; atropine being added to prolong the effect. Whenever any remedy is administered whose action it is desirable to accelerate, the addition of glonoin by opening the vessels secures this object. The ordinary doses are too large—glonoin gr. 1-250 will sometimes cause unpleasant cerebral fullness, and half this dose repeated every five minutes is preferable.

Macrotoin is available for ovarian and uterine pains, for spinal irritation and possibly for fifth-nerve neuralgias. The dose is from 1-2 to one grain, in hot water, every half hour till relief or nausea occurs.

The injection of solutions of osmic acid along the course of an affected nerve has been employed instead of excision—the acid destroying the th



sues. We are not believers in the destruction of diseased tissue, preferring to cure it; and when such a measure is unavoidable prefer clean surgery to the application of an agency less readily limited to desirable effect. The one per cent solution in distilled water is employed, of which a few drops may be injected.

There is an indication for zinc phosphide, in breaking up severe and obstinate attacks. If the therapeusis is timid and tentative habituation will ensue and relief be imperfect; whereas if the remedies are powerful and thrown in vigorously in maximal doses, the effect will be decided. Quinine gr. 2, zinc phosphide gr. 1-6, strychnine arsenate gr. 1-30, ext. cannabis gr. 1-2, given together and repeated every 4 hours, is a model formula for this indication. Zinc phosphide is unsuitable for cases due to cold or to inflammation, or for plethoric persons.

Quinine is employed to forestall attacks of periodic neuralgia, and for supraorbitals. A full dose—gr. 15 of the bisulphate—may be given six hours before the expected attack; or the arsenate or hydroferrocyanate in small doses every waking hour.

No one quite appreciates the value of salicylic acid until he administers it in doses of gr. 1-6 every half hour. The constant instillation of this minute dose prevents the growth of microörganisms and ferments in the stomach far better than a bulky doses given at long intervals. Cases dependent on such fermentation, or on uric acid, rheumatism, etc., and tic when attended with acidity, are amenable to this agent.

Solanine is a drug with a future. It lessens the irritability of the sensory nerve-ends, gives tone to the capillary walls and relieves hyperemia of the nerve centers. In sciatica, gastralgia and other neuralgias it has replaced morphine with advantage, proving effective without the disastrous possibilities following the use of opiates for recurrent pain. The dose of solanine is gr. 1-12 for an adult, every hour till irritation of the fauces denotes the limit of its therapeutic benefits.

Strychnine ranks deservedly as the best all-round remedy for neuralgia, both for breaking a paroxysm and for the intervals. It is especially useful in visceral forms, for those dependent on sexual and other excesses, and whenever there is relaxation of tissue or languor of function in evidence. The various salts are to be applied as indicated; the arsenate for most cases, the hypophosphite when developmental nutrition in the young is obviously at fault, the nitrate for alcoholics and when the renal elimination of solids falls below normal, the valerianate for speedy effect and when nervous equilibrium is lost. The doses should be arranged with scrupulous care. Many persons can bear no more than gr. 1-67 every two to four hours; some have taken with advantage a grain within

**24 hours.** The dose must be gauged strictly by the effects, the pulse-tension being perhaps the readiest indication. Strychnine can be continued with advantage for a month; rarely longer.

When the pulse is hard and wiry, the patient plethoric, the heart hypertrophied, the renal or other elimination markedly defective so that convulsions are possible, the remedy is veratrine. This agent relaxes the vascular tension with certainty, the effect being prolonged to any desirable period by careful dosage to effect. Muscular pain and soreness subside under this drug. It acts on all the eliminants, kidneys, skin and liver; and as there is a toxemia present in very many cases of neuralgia the indication for this agent occurs far more frequently than is suspected by most physicians. Veratrine should be given to adults in doses of gr. 1-134 freely diluted, every half hour till nausea or softening of arterial tension denotes full useful effect. If acute or subacute gastric catarrh is present, or if the patient is very susceptible to the local irritation caused by veratrine, there will be manifested a sense of heat defining the limits of the stomach; contraindicating the further use of the remedy by this route. The combination of atropine with veratrine has not been tried so far as we know, but might prove effective when the cutaneous vasomotor spasm is marked and elimination low.

In the foregoing outline the term "neuralgia" is employed in the widest sense—rather etymologically than pathologically—as it appeals to the clinician in this way. It is nerve pain he is called to relieve; and the institution of effective therapeutics can not be too prompt for the suffering patient. The pathologic diagnosis may wait.

From this long list of remedies the reader may judge of the wealth of our resources for the relief of nerve pain. As we use and study these uniformly acting agents it is evident that most important discriminations as to their applicability in various conditions are to be made. While men gave conglomerations of them without much discrimination such accurate differentiation was impossible. Nearly every prominent alkaloid is a member of a group of closely allied agents, which are at present only known to "resemble" it in a general way, but which will undoubtedly prove to possess special properties of value when studied. We know for instance that brucine possesses a local anesthetic power not enjoyed by strychnine; but what about thebaine, laudanine, calabarine, gelsemine, and the rest of the tetanizant group? We know nothing beyond their general resemblance to strychnine. The study of such groups, under the conditions presenting with modern physiology, may be expected when the therapeutic revival we advocate becomes general.





## PART IX

# DISEASES OF THE MUSCLES

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### INFECTIOUS MYOSITIS

A primary acute or subacute inflammation of voluntary muscles due to an unknown microbe. It affects all the muscles, the muscular fibers and to some extent the connective. Commencing with hyperemia, exudation of leucocytes follows, the muscular fibers become hard, fragile and fatty. Serous infiltration and connective hyperplasia ensue. The disease is most frequent in young men. The causes are unknown. (Look for the gonococcus.)

The malady begins in the extremities and extends to the body. The muscles swell, become firm and stiffen. Tenderness may be present, with slight edema, extending with the disease; erythema appears, followed by pigmentation. Fever and enlargement of the spleen occur early. As the muscles of respiration and deglutition are involved, these functions are seriously hampered. Pulmonary inflammations may complicate or end the case.

Trichinosis presents the great diagnostic difficulty and requires microscopic examination of the muscular fiber. In multiple neuritis there is neither swelling nor edema.

Acute cases occupy two months, chronic ones two years—more or less. Death ends the case, by respiratory implication or complication, unless the heart muscle is attacked. There is no known treatment—which means that the way is clear for the trial of new methods. If the disease is due to a living organism it must be amenable to calcium and arsenic sulphides; it cannot but be aggravated by intestinal autotoxemia; the x-ray, static electricity, heat or cold must affect the disease in one way or the other. The rarity of the malady has prevented extended observations.

### PROGRESSIVE SPINAL MUSCULAR ATROPHY

An atrophic process arises in the anterior cornua of the cord; the ganglion cells and the nerve fibers and supplied muscles degenerate. Sclerosis may involve the pyramidal columns. In hereditary cases it

develops in childhood. It is most common in men after the 20th year and follows over-exercise.

The thenar and hypothenar eminences become soft and flat, lose power, stiffen, coördination is difficult, the thumb lies parallel to the fingers, and the degeneration of the interossei shows in grooves between the metacarpals. The deltoid is next to be affected, and the other hand shows the malady. The quadriceps femoris first shows it in the legs, and various groups of muscles are successively attacked, showing fibrillary twitching, wasting and the reaction of degeneration. Hypertrophy and spastic paralysis rarely occur. Twitching may be developed by slight irritation. The diplegic reaction consists in the development of contractions in the opposite arm when the anode is placed in the carotid fossa and the cathode over the spine. The reflexes lessen with the atrophy. Voluntary motion is for a time compensated by calling other muscles into use, but gradually fails. Late, the diaphragm is affected, and symptoms of bulbar palsy arise. The pupillary reflexes are rarely disturbed. Sweating occurs freely. Death comes from inspiration pneumonia.

The order of implication is different in chronic anteropoliomyelitis, and paralysis comes earlier. Spasm appears in amyotrophic lateral sclerosis. Disturbed sensation, pain and trophic lesions are present in syringomyelia and pachymeningitis cervicalis. Local evidences are to be found in Pott's disease. In peripheral neuritis the fingers are unequally affected and the deltoid is not. Joint symptoms occur in arthritic atrophy, and in muscular atrophies due to excessive use improvement follows rest and treatment.

The prognosis is bad, the malady tedious, and patients are apt to die of pulmonary intercurrents.

Treatment is dubious. The usual measures are advised rather hopelessly: massage, various forms of electricity and hydrotherapy, and dry hot air. Gowers advised hypodermic injections of strychnine nitrate in advancing doses.

## PROGRESSIVE NEURAL MUSCULAR ATROPHY

Nervous followed by muscular degeneration, contractures, sensory disturbances and loss of reflexes. Chronic interstitial neuritis arises, with connective hyperplasia and atrophy of the nerve elements. The degeneration extends to the posterior columns of the cord. The disease is probably inflammatory. Many cases are of nervous heredity. Men are most frequently affected, beginning between the ages of 10 and 20.

The atrophy begins in the muscles of the toe extensors, peronei, small foot muscles, thenar or hypothenar eminences, and interossei. The malady is usually symmetric. The feet soon club, the toes claw, the foot drags, and in the hands the balls of the thumb and middle finger flatten. As the interossei atrophy, grooves appear between the metacarpals and the hand claws. The fibrillary twitchings are severe. The calf, forearm, thigh and arm are involved, spastic contractions occur, and loss of electric irritability or the reaction of degeneration occurs. Even in muscles not yet showing disease the reactions are weak. Tendon reflexes soon subside. Sensation may be weakened, tactile, pain and temperature; paresthesia occurs, sometimes quite decided pains. General health and nutrition are unaffected.

The sensory disturbances differentiate from spinal atrophy; the absence of sphincter disorder from ataxia; the period of appearance and progress from infantile palsies. The course is slow and does not threaten life but the chance of cure is small. Treatment?

Dejerine describes an infantile hypertrophic and progressive interstitial neuritis, with similar muscular symptoms but also ataxia, lancinating pains in the limbs, marked sensory disorder. Romberg's sign, myosis, weak pupillary reflex and nystagmus. The nerve trunks are enormously hypertrophied. The muscles are degenerated, the nerves show connective hyperplasia, the posterior columns also are degenerated. The malady appears to be hereditary. Romberg's sign consists in swaying of the body when standing with the feet close together and the eyes closed.

## PSEUDOHYPERTROPHIC MUSCULAR PARALYSIS

While the electric reaction of the muscles is unaffected there is a loss of motor power, as they increase in size and firmness. The fat in the perimysium internum increases; the muscle fiber being normal, atrophied or hypertrophied, as well as the connective. The nerve fibers are not affected. The disease is passed by females to males. There is sometimes a connection with mental disorder, and Gowers traced a dependence on consanguineous unions when repeated. The malady appears in early life and cases beginning subsequent to puberty occur in women.

The calf muscles enlarge, less often those of other regions, as the masseter and infraspinatus, contrasting markedly with unaffected muscles. Fibrillary contractions are infrequent. Electric reactions are merely weakened. The gait is uncertain and waddling. The patient



has difficulty in rising from lying down, and does so in a characteristic manner, getting on hands and knees, then extending the legs, placing one hand on a knee and pries himself up. Later the affected muscles atrophy, contractures cause clubfoot or spinal curve, power gradually fails and the patient dies of progressing debility. The intellect may be undeveloped or deranged. Epilepsy is sometimes present. In the *forme fruste* the atrophy sets in rapidly. The diagnosis is easy, prognosis bad, the only definite suggestion as to treatment the use of massage and muscle training, to retard progress.

### PROGRESSIVE MUSCULAR DYSTROPHY

In Erb's type a primary myopathy begins in the muscles about the scapula at the time of puberty. The muscle fibers are irregularly atrophied and hypertrophied, striation disturbed, nuclei multiplied, connective hypertrophied, the nerves and cord showing no alteration. The malady is usually hereditary, sometimes sporadic; appears after emotional storms or overexertion; affects the sexes equally, and rarely appears after the 20th year.

The pectorales and latissimus dorsi are first affected, then the serrati, spinal muscles, forearm flexors and long extensors, glutei, quadriceps femoris; the muscles least likely to be affected being the sternomastoid, spinati, deltoid, sartorius and calf group. As the muscles waste, the strength, reflexes and electric reactions lessen. The reaction of degeneration is not presented. The atrophy causes the scapulæ to project like abortive wings; lordosis arises from the loss of support; the performance on arising is that described in the preceding article; and facial involvement may cause difficulty in whistling, speech or closure of the eyes. Dyspnea—fatal—may follow involvement of the diaphragm. Motion is impaired, the gait is waddling, but sensation is unaffected and the sphincters are not involved, nor do bulbar symptoms appear.

Diagnosis may be difficult if the face is involved. The history and age when attacks begin are significant. Prognosis is hopeless. The course is slow and progressive, running for many years. Treatment remains to be developed.

In the Dejerine-Landouzy type the muscles of the face, shoulder and arm are affected, the *facies myopathica* appearing. The histologic changes are similar to those in Erb's type. Heredity is manifest. The affection begins about the 3d year, in either sex, affecting but one sex in a family, and is sometimes preceded by an acute infection or by some nutritive disorder.

The muscles of the eyelids and mouth degenerate, the upper lid fails to cover the globe, the under droops, the upper lid wastes, wrinkles disappear and the face is stupid. Facial movements are lost and the eyes become fixed. The shoulders next atrophy: the trapezii, rhomboids and pectorales; then the deltoids, bicipites, tricipites and extensors. The muscles of mastication and those of the forearm and hand are least likely to be affected. The scapulæ project and are abnormally movable. Electric reactions diminish as atrophy increases. Tremor is rare. Strength lessens as wasting increases. Sensation is unaffected.

Spinal, neural and congenital forms are to be distinguished by the history and the absence of sensory disturbance, tremors, twitching and the reaction of degeneration. The course is slowly progressive, prognosis hopeless, duration very long, treatment still open for discovery.

Leyden's hereditary muscular paralysis affects children between 8 and 10 years of age. It is hereditary and affects the muscles as in the pseudohypertrophy, but without an increase in size.

### ARTHRITIC MUSCULAR ATROPHY

When a joint has been temporarily disabled by inflammation the muscles commence to atrophy. The muscle fibers shrink, the nuclei proliferate, the striation grows indistinct; the nerves remain unaffected. If this were due solely to disuse all the muscles would be affected equally, but this is not the case, and the atrophy supervenes too quickly sometimes. It is attributed to reflex action for want of a better explanation.

The wasting occurs quite rapidly, the electric reactions weakening, the reaction of degeneration being absent, the irritability to stimulus and the reflexes greatly increasing. Fibrillary twitching may occur.

The diagnosis is simple, and usually improvement follows subsidence of the arthritis, but atrophy may persist and contracture follow. Treat the arthritis, and as soon as it has subsided apply gentle massage and faradism to the affected muscles.

Muscular atrophy also follows other injuries, fractures of bones, and prolonged overstrains. Massage, faradism and local feeding by rubbing hot oils well into the skin, are useful.

Muscular hypertrophy occurs idiopathically, the fibers developing, with slight evidences of degeneration. The cause is unknown, but neurotic ancestry has been established. The muscle enlarges and increases in strength, but is susceptible to fatigue readily, and sometime the strength is diminished. Diagnosis from pseudohypertrophy may be difficult. Prognosis is bad; no known treatment.

**MYOTONIA**

Congenital myotonia is a hereditary affection in which muscle groups voluntarily contracted remain for a brief period in contraction which slowly relaxes. The peripheral nerves are unaffected. The muscle fibers are short and thick, the nuclei multiplied, protoplasm cloudy, sometimes vacuolated, and the connective normal. Heredity is established. Excitants are overexertion, emotion during pregnancy, exposure to cold, fright, or other emotional shock. The neurotic constitution underlies. It develops early, sometimes with mental disease.

When after rest the patient attempts to put a set of muscles into active contraction, the subsequent relaxation is delayed for perhaps half a minute. If the same movement is repeated, each time the relaxation recurs quicker until it is normally performed. The entire muscular system may be affected but usually the muscles of the face escape, except those of mastication. Painful injuries result from the delay of successive motions. The arms or the legs may be alone affected. Moderate exercise, heat and mental equipoise lessen the difficulty, which is increased by excitement, cold or fatigue. The pharynx, sphincters and unstriated muscles are never involved. No pain is occasioned except slight cramp. Sensation is unaffected. The patient grows irritable, misanthropic or melancholy. The reflexes may be normal, increased or lessened. Mechanical irritation of the motor nerves is normal or lessened, of the muscles increased and slowed with slower relaxation; faradic irritability of nerves normal, of muscles causes long contractions; galvanic irritability quantitatively increased, qualitatively altered—ACC equaling KCC—all contractions slow, tonic and prolonged, and rhythmic contractions passing over the body in waves moving at the rate of one to three per second. The muscular development is that of an athlete without the power.

Diagnosis is obvious. In pseudohypertrophic muscular paralysis the muscles are weak and do not give the myotonic reaction. In tetany the contractions last longer, the pain is severe, and Trousseau's sign is present, muscular spasm on pressure over large detached arteries or nerves. In spastic paraplegia and Little's disease the spasm is permanent. In occupation neuroses the spasm appears only on certain movements being attempted. Hysteria presents its stigmata; the patient carefully avoids disfiguring injury and the electric reactions are absent.

Prognosis is hopeless. A remission may occur, and in one case proved permanent, following the lady's marriage. Life is not abbreviated



unless through injury received in falls. Treatment is unsatisfactory. Patients learn certain means of mitigating their distresses. Exposure to cold, and emotional stress, are to be avoided.

### MYASTHENIA GRAVIS

In asthenic bulbar paralysis the only changes found are in the electric reactions of the muscles. There is progressive weakness, with increased susceptibility to fatigue, and the myasthenic reaction. The cause is unknown. The pathology is undiscovered. It affects particularly the muscles concerned in mastication, deglutition and speech, and the eye group, in varying degrees. The body muscles are weakened. Dyspnea may arise, with difficulty on walking. The striking feature is the quick development of fatigue on exercise. Hence the eyelids droop. The reaction of myasthenia—at each repetition of faradic contractile force the contraction is less until it ceases to occur.

The course is variable; remissions occur, the patient dying finally of exhaustion or dyspnea. Some choke when trying to swallow. Women are worse during menstruation.

While the malady resembles ordinary bulbar paralysis, there is no reaction of degeneration here, no myasthenic reaction there; and the unaffected muscles are not specially liable to fatigue. In polyencephalitis we have oculomotor nuclei lesions, a sudden onset, muscular wasting, and degeneration reactions.

There is no known treatment. The stomach tube may be required to prevent choking.



## PART X

# INTOXICATIONS, ETC.

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### ALCOHOLISM

The immoderate use of alcoholic drinks gives rise to two forms of poisoning—the acute and the chronic. The acute form may appear in the form of *mania-a-potu*, or alcoholic delirium. Additional potations reduce the victim to alcoholic coma. Delirium tremens is a form of alcoholic insanity, while the term dipsomania is applicable to cases where periodically an irresistible impulse for alcoholic debauch arises.

**Pathology:**—When death occurs from acute alcoholism the brain and kidneys are hyperemic, the mucous membrane of the stomach and duodenum likewise congested and covered with mucus. Chronic alcoholics show degeneration of the specific tissues of every organ in the body, with hyperplasia of the connective envelopes, the process beginning with the stomach and duodenum, and following the alcohol to the liver, the nervous and other tissues throughout the body. The degree of degeneration depends on the length of time during which the alcohol has been habitually taken, the early age at which it was commenced, the manner of taking, and the resisting power of the tissues. Fatty degeneration is especially prominent in those who drink malt liquors, While connective hyperplasia and subsequent cirrhosis characterize the spirit drinker. The stomach is always catarrhal; in the drinker of beer it is also dilated. Changes in the kidney follow those in the liver. Arteriosclerosis is a result of either form of liquor. Sclerosis occurs in the brain, with chronic pachymeningitis, serous effusions, atrophy and in many cases alcoholic neuritis.

**Etiology:**—The craving for alcohol is transmitted. The writer knows one family in which every male for nearly two hundred years has displayed the craving for alcohol. Children of alcoholic parents display an unusual fondness for spices and foods and drinks with sharp decided flavor. Alcoholism is one of the interchangeable neuroses, and the inebriate's children may display their heredity in insanity, idiocy, deaf-mutism, epilepsy, neuralgia, neurasthenia, drug habits or diabolic depravity, as well as alcoholism. Conversely, either of these



affections may be transmitted to the children in the form of an alcoholic tendency.

Many persons who do not inherit this craving become alcoholic through the occasional use of this drug as a remedy for ill-health, as a means of temporarily increasing the power for work, for convivial purposes, or simply as a habit, thoughtlessly and unconsciously formed. There seems to be no reason for doubt that many persons form the alcoholic habit unconsciously, by taking patent medicines; but the vast majority of inebriates is recruited from the great army of the neurotics.

**Symptoms:**—From beginning to end the effect of alcohol is paralyzing. It relaxes the vasomotors, allowing an increased quantity of blood to pass out of the arteries, especially to the skin and the brain. A sense of warmth and well-being follows. Self-consciousness is first affected and the victim forgets himself in his interest in the subject matter of conversation; he therefore speaks out with confidence and fluency, which gives him and others the impression of a stimulation of the mental powers. Repeating the doses of alcohol, the increasing paralysis of the nerve centers is shown by muscular incoördination, paralysis of judgment and consequent improper, incoherent or delirious speech, the loss of self-control, imprudent expressions and quarrelsome tendencies, or the delirium of exaltation. Gradually paralysis of muscular power supervenes; consciousness is more and more overwhelmed until the patient sinks into alcoholic sleep, coma or stupor. The respiration is stertorous, face congested, pulse slow and weak but full, the skin cool, the breath alcoholic, the urine and feces sometimes incontinent and the entire muscular system in a state of complete relaxation. This lasts a variable time, according to the quantity of alcohol absorbed. On awaking the patient is in a state of profound toxemia, with throbbing headache, nausea, anorexia, scanty excretions and general mental and physical prostration. Sometimes the direct effects of the alcohol induce an acute inflammation of the stomach or of the kidneys.

Acute alcoholic insanity may follow a single heavy debauch. It may be homicidal or suicidal, or take the form of epilepsy. Acute melancholy may develop. Delirium tremens occurs in men who have drunk excessively for a prolonged period, usually taking scarcely any food. It may be regarded as a saturation of the system with uneliminated toxins.

Acute alcoholic paralysis sometimes occurs from a multiple neuritis, which subsides after a few weeks' abstinence.

Chronic alcoholism is now looked upon as a disease, although there is no question as to the powerful influence exerted over it by the awak-

en ing of religious emotion, which imparts to the patient a sufficient stimulus to his weak will and enables him to conquer the diseased appetite. There is no safety for any form of chronic drinker, whether it be the man who takes a few cocktails daily, wine for every dinner, or beer with every meal. The tendency invariably is to increase the quantity taken, as in time the system gets to depend upon it for that sense of comfortable well-being which any healthy man may have without alcohol, who keeps his bowels regular and his conscience clean. The stomach gives out first, gastric catarrh developing, with anorexia, bad breath, difficulty of digestion, a coated tongue, nausea before breakfast, and constipation. Muscular tremors occur later; the muscular powers decline and the gait becomes uncertain, work grows more laborious unless constant stimulation is resorted to. The mental powers become fixed, their excursions circumscribed, with decay gradually supervening. The moral sense is blunted, but this is a late symptom and largely due to the increasing selfishness of the patient.

If the alcohol be taken in the form of beer the stomach distends, while heart, liver and kidneys give evidence of fatty degeneration. Wines tend rather to the production of gout and gravel; while strong liquors induce cirrhosis of the liver with its sequences of chronic intestinal catarrh, hemorrhoids, enlarged spleen and ascites, as well as chronic interstitial nephritis. Drunkenness is not necessary for the development of any one of these groups. The writer recalls a fatal case of hepatic cirrhosis, in a very distinguished officer, who never was intoxicated in his life, but who probably never missed a day for thirty years in which he did not take two or three moderate drinks of some strong alcoholic liquor.

Some cases end in dementia, few in permanent insanity. The men who finish by never allowing themselves to become perfectly sober, present a characteristic appearance; their bodies are heavy, flabby and relaxed, weak in muscular power and deficient in tone. The eyes are swollen, red and watery, the face puffy or contracted, showing very often a peculiar dusky flush, the vessels of the nose and cheeks dilated, the mental and physical capacity gradually reduced, the affections lost in overwhelming selfishness, the one point of mental activity being the craving for liquor. The heart is weak and flabby, with palpitations, sharp pains, distress and short breath. The degenerations of age come on prematurely.

Delirium tremens occurs after a prolonged debauch. Usually the patient has scarcely eaten anything while drinking, and the symptoms were for a time attributed to the lack of food, but it is now admitted

that this is really a form of acute toxemia from the failure of elimination. The patient awakes with tremor, or is unable to sleep, or fears to do so on account of terrible dreams. He talks incoherently and sees things that do not exist—usually unpleasant things, creeping and crawling creatures varying from bedbugs and roaches to calico anacondas and Dolly Varden alligators; in fact, a patient once assured the writer that he was prepared to give Noah points as to numerous omissions in his menagerie. Sometimes the hallucinations are graver, possibly with remorse commingling, and the patient leaps from a window or takes other means of suicide to escape from the supposed pursuit of the avenger. Muscular tremors increase, the pulse becomes soft, rapid and fluttering, the tongue tremulous, dry, brown and fissured. Subsultus tendinum, carphologia, coma vigil and low muttering delirium justify the appellation given to this condition of the "typhoid state." The urine is notably scanty, the bowels constipated, or there is diarrhea of extraordinary fetor. The breath is overpoweringly bad, and it is with the greatest difficulty that the patient can be persuaded to eat. In favorable cases improvement begins after the third day and convalescence follows the first sound sleep. In others the exhaustion deepens and death occurs from this cause, from sudden heart-failure, pneumonia or apoplexy.

**Diagnosis:**—Persons picked up drunk are sometimes supposed to be suffering from opiates, epileptic, uremic or other toxic conditions. More frequently the error is the other way, and comatose persons are thought alcoholic until the post-mortem discloses the mistake. Alcoholic coma is rarely so complete but that the patient may be aroused by holding ammonia under the nose, or by pressing on some sensitive spot, such as the "crazy bone" or the supraorbital notch. The complete muscular relaxation, the pupils not contracted, and the alcoholic breath are the principal indications.

When the history of chronic alcoholism is wanting, the diagnosis may be made by the morning tremor and vomiting, the mental weakness and restlessness, and a certain easy way the patient has of assenting to almost any proposition that may be made to him, or rather to her, since this especially applies to women. The flushed face may give the sign, or the general relaxation throughout the body. However, the diagnosis is usually only difficult when the possibility of alcoholic indulgence has not occurred to the physician.

**Prognosis:**—In the acute forms the prognosis is good, provided the physician can control his patient. When alcoholism coincides with pneumonia there is very little hope. The alcohol habit once established leaves



indelible traces in the tissues; nevertheless there is hardly any stage at which recovery is impossible. Even though relapses are frequent the patient is the better for making the effort to free himself. The immediate effects of alcohol subside when it is discontinued, and although the cirrhotic process may not abate, patients who have long been inebriate and show well-marked evidences of the disease may live many years in very fair health and comfort, with judicious treatment if the alcohol is stopped.

**Treatment:**—Generally a drunken man comes out of his coma in due time if let alone; but if the evidences of depression are so serious that life is in peril the vital forces should be sustained by full doses of strychnine hypodermically, while the remaining alcohol is washed from the stomach and its further absorption stopped. It is sometimes imperative to sober such a man as quickly as possible. Not infrequently the premonitory trepidation with which the average man views his approaching wedding leads him to indulge in bibulous props until he is reduced to coma, with the wedding only a few hours off. In such cases the stomach should be emptied, when a Turkish bath will usually restore the man to presentable condition. This is safer and better than a pilocarpine hypodermic, which has been used with success; but as this occasionally induces pulmonary edema, the combination might be fatal.

In all acute forms, including delirium tremens especially, the alcohol should be stopped immediately and absolutely. Abundant hospital experience has proved the enormous superiority as to results of treatment when this is done. This is now so well understood that the solicitations of the patient to be permitted to taper off, are no longer backed as formerly by the conviction of his friends of the absolute necessity for this procedure. At one time it was thought that the leading imperative indication was to secure sleep, and many deaths resulted, not only from the opium but from the chloral and bromide substituted later. Then came the era of heart tonics, and tincture of digitalis was given in enormous doses, with better effects. When delirium tremens came to be considered a symptom of denutrition, attention was deflected to the stomach, and the patient was gorged with food, to his great detriment; but out of this grew the most useful expedient yet devised, which was the administration of capsicum in doses of a scruple and upwards. This proved decidedly beneficial in two ways—its administration put an instant stop to the patient's craving for liquor, and the powerful stimulation of the vital functions aroused all the lagging powers and powerfully aided the patient in throwing off the effects of the poison.

Finally we have arrived at the true state of affairs. Delirium tremens is an acute toxemia, due to the check of elimination. The most effecti

remedy that has yet been suggested is pure emetine, entirely deprived of cephaeline. This is to be given with every precaution to avoid its being vomited. The patient is put to bed and given one grain of emetine, in tablets, which are to be swallowed whole, if possible, without any liquid; the patient is then enjoined to lie perfectly still for fifteen minutes, in which time he will almost certainly fall asleep. In eight hours he will awake, sane and quiet, will have one or two spinach-colored stools and be ready to relish his breakfast. If the emetine is vomited, a similar dose should be given immediately. Obstinate vomiting may require a preliminary dose of cocaine or a hypodermic of morphine over the stomach.

The writer has employed all the methods of treatment above described, and others, falling into every error he has charged upon the profession, and from his experience looks upon the emetine treatment as leaving nothing further to be desired.

The food for these patients should consist of the most easily digested articles procurable, especially the acid meats, like soured pigs-feet, raw oysters and beef with lemon juice or vinegar. Following these the juice of grapefruits or oranges should be given with lavish hand, with raw oysters and eggs, warm milk and coffee.

The work of elimination should be continued by the use of warm baths, massage, and if necessary, flushing the kidneys by saline solution introduced into the colon. Nightly doses of emetine should be given to insure sleep and restore hepatic function.

The treatment of the alcohol habit requires residence in an institution for that purpose, for a period of not less than six weeks. The tremendous power of suggestion is to be employed whenever there is an opportunity. The marvels actually obtained by the various secret methods are exclusively attributable to suggestion. As a part of this method means are taken to render the use of alcohol disagreeable to the patient. For this purpose an unpleasant fullness of the head is caused by the use of glonoin and atropine, and this is sustained until the dangerous period has passed.

Persons who persist in the craving for alcohol despite the above remedies, are given a hypodermic injection of apomorphine simultaneously with a big drink of liquor. The resulting effects of the apomorphine are attributed by the patient to the liquor, and a feeling of disgust towards the latter is induced. In the meantime the patient's condition should be carefully studied, and whatever treatment is indicated should be applied. The custom of subjecting all these cases to a single routine is most reprehensible.

All patients probably need to have the bowels cleared out by cholagoges and salines, the liver unloaded and the nerves quieted with emetine, renal

elimination secured, and the diet arranged so as to give a full and abundant supply of nourishment to replace the false stimulus of the alcohol. The food should therefore be highly nutritious, easily digestible, should embrace all the groups that form a perfect diet, and should be given in reasonable quantities every four hours. It is impossible to give too much fruit juice. Warm baths and massage are of inestimable service in aiding elimination, and when the patient's strength will permit, the cold plunge, followed by a brisk rubbing and comfortable wrapping up in bed, causes a sense of comfortable well-being superior to that afforded by alcohol.

With all this, however, the patient who has long been accustomed to alcohol will have a sense of helplessness and relaxation that constitutes a strong incentive to a resort to alcohol. This condition, however, is forestalled by commencing, as elimination is reestablished, the administration of strychnine. This is to be given in carefully adjusted doses, so as to restore and maintain normal tonicity as indicated by the pulse; in fact, the patient leaves the institution with the strychnine habit. Under judicious management, however, his returning vigor permits a gradual diminution of the doses until they may be safely discontinued. Attention to elimination and digestion can never be discontinued without the peril of a relapse. Patients upward of fifty, who have been twenty years or more saturating their nerves with alcohol, will generally take the strychnine the remainder of their lives. To this there is no special objection.

He who limits his treatment of the alcohol habit to the above consideration has but a narrow sense of his functions as a physician. A close study of these cases will generally disclose causes for the habit in the moral sphere, and sometimes these can be remedied. The writer has known a confirmed inebriate of many years' standing to be completely cured by separation from an uncongenial wife and marriage to a mate who knowingly assumed the responsibility and successfully met it. In one case the patient's family noticed that for several days before a debauch his stools became fetid and devoid of bile. They were instructed to watch for this sign, and whenever it occurred he was given a grain of emetine, with the result that the sprees were completely prevented. In another case the writer accidentally discovered that the man was a lover of flowers, and changing his residence from the city in which he languished to a farm, resulted in a complete and permanent cure. In still another case the craving for alcohol was found to be seated no deeper than a catarrhal pharynx, and as this was cured the craving for alcohol disappeared. One more instance: A young physician of much more than ordinary promise consulted the writer about a growing addiction to alcohol. The fullest instructions were given to his wife as to his care at home, he being un-



willing to leave his practice and promising the fullest compliance with my instructions. A few days after, the writer called at his house about ten a. m., and found that the physician had just returned after having been out a large part of the night with an exhausting case of obstetrics. He sent out for his breakfast, which when brought in to him consisted of meat and vegetables which had been placed in the oven when the family breakfasted, and when brought to him were so thoroughly dried out as to be simply uneatable. The wife was off on a shopping trip. This is a fair sample of the attention given at the patient's home to the physician's instructions. The unfortunate man died shortly after of alcoholic pneumonia.

Sometimes alcohol in the ordinary forms is either inaccessible or the patient acquires a craving for something further. In France this is met by absinthe; in some countries ether is used as an intoxicant; in others essences of lemon, ginger or other volatile oils, or cologne water, are indulged in. When beverages containing volatile oils are employed, the destructive effect of alcohol upon the kidneys is enormously increased. Absinthe and probably ginger also impair the structure of the brain, so that a distant set of symptoms results therefrom. The effects of ether are probably similar to those of alcohol but more quickly induced.

The utmost care must be had in dealing with women addicted to the use of stimulants. The problem is much more difficult than with men, for many reasons. Whenever a woman shows the slightest inclination to a liking for alcoholic medicines or beverages, the physician should avoid their use. Many a woman has commenced the course that leads to inebriety by the use of coca and other medicinal wines, elixirs or liquors. One to whom tincture of capsicum or myrrh was prescribed in ten-drop doses increased this until she took a pint of the mixture in 24 hours. Freedom from danger is by no means the least of the advantages accruing from the use of the active principles in granules. The diagnosis of alcoholism in women is difficult, even to the experienced. An incautious movement may lose control of the case, as occurred in the following: A physician was called upon for a lady who showed signs of approaching delirium tremens. The family could not understand where she got her liquor, as they thought they had guarded against every possible source of supply. The physician had recently heard of cologne drinking, and mentioned it as an example, without a thought that it applied to the present case. But the family, who had never heard of such a thing before, at once exclaimed that the mystery was solved, since she bought cologne by the gallon. The physician at once realized his mistake. During the day he was dismissed from the case, and shortly afterward received

from private sources an intimation from the lady of her undying resentment. Had he kept this knowledge to himself, he could by holding it over the patient's head have kept her under such control as would have permitted a cure.

### CHLOROFORM HABIT

Of all the drug habits known that of chloroform-taking is the most absolutely incurable when once fully established. Usually the patient simply goes to bed with a bottle of chloroform, and keeps up the stupefaction from it as long as the supply lasts. It is said that women once addicted to this habit are never cured, the only ends being death and the insane asylum. Observations are wanting as to the effects of this on the human constitution. The causes are those of drug habits in general—the desire for temporary oblivion. It would seem as if the chloroform habit should be especially prevalent among those who suffer from cancer, inveterate neuralgia and other painful disease; but it seems that such patients resort rather to morphine.

If the patient is a woman, a cure can only be wrought through her affections. The drug must be at once absolutely and certainly withdrawn, and she must not be allowed access to any other narcotic drug, not so much as a bottle of essence of peppermint, or a nutmeg, or a piece of camphor. This restriction must continue long enough to allow of her thoughts and emotions being concentrated upon some object with sufficient intensity to replace the picture of the drug. There is no medical or hygienical treatment for the chloroform habit *per se*, beyond what may be indicated by the condition of the patient outside of the habit. She may need tonics, she generally needs cathartics and eliminants, and she surely needs an interest in her life superior to that of drug-drunkenness. The conditions necessary for a cure are obviously impossible without prolonged residence in a properly equipped institution.

### THE COCAINE HABIT

The causes of the habitual use of cocaine are similar to those of morphine, in fact, the majority of cocaine habitues have simply added this accomplishment to the use of morphine. We have never been able to extract from a cocaine habitue a definite reason for his indulgence in the drug. Ask him what pleasure he derives from it, and he cannot tell you; ask him why he takes it, and he has no reply.

There is nothing to be said as to the effects of cocaine upon the body. Its effects as shown in the psychic realm are, however, striking and unique.

The cocaine habitue may take his drug by hypodermic injections or by snuffing it up the nostrils, not very often in any other manner. He never takes much, but uses small doses incessantly; he cannot keep still, but restlessly wanders up and down, in and out, reminding one of a caged leopard.

One of these patients under the writer's care would get up, take a little whisky, then smoke a cigarette, then take a hypodermic of morphine, then snuff a little cocaine solution, then take a few drops of peppermint, then another cigarette, and so he would go on the livelong day and half the night, scarcely permitting five minutes to elapse without taking something, until well along into the latter part of the night a huge opiate or a dose of hyoscine would put him to sleep for a prolonged period. The cocaine user is companionable, quite chatty, tells a good story and appreciates one. He sleeps little at night but puts in the time writing interminably. In the morning the results of his writing are found scattered over the floor or in the waste-paper basket. Gather up the scattered sheets and arrange them, and you will find his productions seem to be quite readable; but as you go along you begin to wonder what he is really talking about, as there seems to be neither beginning nor end, nor any connected sense, nothing but fine sounding phrases without thought back of them.

The most remarkable effect of this drug is the extinction of the moral sense. The opium habitue will commit any crime to obtain his drug when the pangs of abstinence are upon him; but the bitterest remorse will follow, and in his normal condition of drug-equilibrium his conscience is of the tenderest and he would not knowingly wrong any living being. The moral sense of the alcohol inebriate becomes blunted as do his other perceptions, but it is never lost until his mentality sinks with cerebral degeneration. The cocaineist is a soulless man; he is capable of any crime, and after it will sleep like an innocent child, and crack jokes next morning as he thoroughly enjoys his breakfast. As the habit progresses, he begins to "see things"; he will come home and coolly and unconcernedly inform his family that he has just murdered some one under conditions of the utmost atrocity, and that a mob is coming to lynch him, which may or may not be true. He is perfectly capable of doing this, and sometimes he does it; but he is such an unconscionable liar that it may be prevarication, or again an insane delusion. Some years ago the writer advanced the opinion, based upon a study of cocaine habitues, that the crimes for which negroes are lynched are possibly dependent upon their use of cocaine, since this drug has of late years come to be habitually used by many of the lower orders of this race. This observation is evidently not without foundation, and a number of



the southern states have passed laws forbidding under penalty the sale of cocaine excepting on prescription.

It is this destruction of the moral sense which renders it so difficult to cure a cocaine habitue; in fact, the writer believes that a cure is impossible unless the patient can be restrained from all access to cocaine for the full period of one year. There is no treatment required, no precaution to be observed; the drug is simply to be stopped, and that is all. No symptoms result from the stopping.

### THE MORPHINE HABIT

Can the morphine habit be cured at the patient's house? Yes, provided the doctor has the three prime requisites at his command: (1) Complete control of the patient's supply of morphine; (2) the patient gives up all work and devotes himself exclusively to the business of throwing off the habit; (3) the physician has the necessary means and appliances to relieve suffering and the skill to use them properly.

Without these the most skilful specialist will fail in any but the easiest cases. And let us say that the asserted painless cures one reads about in the advertising circular are either lies, pure and simple, or they are cures of the easy cases, hardly deserving of the name of "habit". Nevertheless we must not expect the patient to admit that his was an easy case. Nothing affronts a man more deeply than to intimate that his own case has not been peculiarly difficult or his suffering phenomenally excruciating. But when one has conducted hundreds of men and women through the ordeal of breaking off drug-habits, he learns to estimate pretty accurately the relative amount of suffering of each, the silent endurance of one of nature's noblemen, and the eloquent exaggeration of the most trifling discomfort on the part of the morphine-hungry party, who thinks she will get her drug if she only makes fuss enough.

The specialists who have devoted their lives to the treatment of this disease, narcomania, agree in affirming that no confirmed habitue can free himself without a struggle, and devote their energies to reducing the unavoidable suffering to a minimum, making the ordeal as short and as easy as possible. Regnier, Erlenmeyer and Crothers, men whose names are known all over the world for their scientific work in this department, all recognize the truth so well expressed by Hare, that "when a patient goes through the withdrawal without suffering, you need not flatter yourself that it is on account of your treatment; it is because he has a secret supply of his drug."

Compare these statements with those of the advertising fraternity and it will be seen how far these unknown, often illiterate, individuals are ahead of the scientific specialists. The advertisers "cure their patients at the latter's homes, without detention from business; the cure is easy and painless; the patient never knows when the morphine is withdrawn, so imperceptibly is it accomplished. Any case can be cured in periods varying from three weeks down to fifteen minutes."

That these miraculous powers should be denied to the educated man of science and lodged in the hands of these persons would seem remarkable, were it not that we know that these gentlemen are not in business for their health, and that, viewing the matter from a strictly commercial standpoint, it has a different aspect than when looked upon from the purely scientific point of view.

Do not imagine that we believe no good can come out of such sources. There is some chance of a quack discovering a good thing, as well as any one else. The only question is as to whether he really has done so or merely claims this credit, which is a very different thing. We have taken pains to investigate all these claims which came within our cognizance, and these are some of the results of our investigations:

A doctor wrote us of a popular "home treatment," saying he had known of its success, and had analyzed samples sent at his request, and found no morphine in them. By our advice he obtained a sample from a patient who was under treatment by it, and in this we found abundance of morphine. The remedy for the morphine habit was morphine, and the method contemplated a gradual reduction of the dose until it was entirely withdrawn. We have met a number of persons who had tried this method, and their testimony has invariably been that they could reduce the dose to a certain point, when the symptoms of withdrawal began, and then they had to increase the dose or add an opiate. The withdrawal symptoms will show up whenever the cells have been drained of morphine, no matter how slowly it is done.

Another party stupefies his patient with chloral, keeps him thus for some weeks and then sends him home with the assurance that he is cured. When the chloral has been eliminated, the withdrawal symptoms appear in full force, and the victim has the whole struggle before him, just as if he had simply stopped short, only that he is poorer by the sums paid for his "cure."

A third variation of the miracle-cure is to get the patient off the morphine and upon alcohol, cocaine, cannabis or codeine. Of these drugs alcohol is known to every one, and whether it or morphine is the

worse as a habit-drug our readers are as able as we to judge. Cocaine is the most disastrous in its effects on the human brain of any habit-drug we have ever heard of. Between it and morphine there is no question as to the choice. Cannabis is possibly less injurious than the opiates. But as yet no observations upon its effects, immediate and remote, upon numerous individuals, have been made public. My own experience has been that every case, after using the cannabis for a time, went back to the morphine. The same thing is true of codeine. The use of these two drugs keeps up the appetite for, and habit of reliance upon, a narcotic drug, and keeps the door open for the return of the archfiend morphine.

There is one method of the advertisers that has real value—the elimination system. By this they guarantee to cure any case of opiate addiction in forty-eight hours. The patient is given emetics and cathartics until the bowel is completely emptied, the “residual bile” and the morphine stored up in the tissues are discharged. If thoroughly done, the urine will not respond to the test for morphine. The withdrawal symptoms come on at once, and if the patient has the nerve to bear them for a limited time, crisis occurs and he is free.

This method, then, is Lewinstein’s abrupt withdrawal, with the great improvement of the thorough evacuation and rapid elimination. It is suitable for young and strong patients, with sound heart and good will-power who have not taken the drug very long or in large doses. With the ordinary habitue there are the grave dangers of collapse, inflammation of the bowels and a sudden stoppage of the activity of one or other of the vital organs, long accustomed to perform its functions only under the influence of the drug. These dangers are reduced greatly if the patient is under the constant surveillance of his physician and the latter has the requisite skill and experience in the treatment of drug-cases; but, still, it is a method suitable only for selected cases, and not by any means generally applicable.

Having thus cleared the ground, we are prepared to consider (1) what is the pathological condition present; (2) what is the best mode of treatment; (3) what results are to be expected from treatment?

**Effects:**—Bacon suggested that a daily dose of opium would prolong life; his thought being that by the use of this drug the bodily functions would be carried on more slowly and the consumption of vitality would thus be lessened. That the drug has the property of delaying the vital functions is true enough; but, unfortunately, it is upon the all-important processes of digestion and elimination that it lays its paralyzing grasp.



The secretion of the gastric juice, of the bile and, in fact, of all the digestive principles, is checked; the movements of the intestinal musculature and the sensibility of the mucous surfaces are decreased; so that the retention of fecal masses is an invariable condition in opium habitues. The sense of hunger is removed also, so that the patient really decreases his consumption of food to a minimum, but he lives on his own tissues instead. The loss of weight is gradual, not apparent for years, perhaps, but in the latter days it becomes extreme, the skin hanging loosely upon the bones, the thin, poor limbs, the sunken cheeks and lack-luster eyes being a pitiful sight.

In some instances the use of opium restores the appetite and even enables the patient to put on flesh; but in every instance of this sort which has come under my observation it has turned out that the drug masked or held in check some grave structural disease, most frequently an affection of some part of the digestive system.

On the mental functions the use of opium exercises an influence closely resembling that of alcohol. The first effect is stimulating; the intellect appears to become stronger and clearer for the time; but with each fresh stimulation the brain becomes less able to functionate without the drug. And slowly but surely the mental horizon contracts, the range of the mind's possibilities narrows and its work is more closely restricted, until outside of the routine work to which he has been accustomed, the habitue is incompetent to perform any but the simplest exercise of his reason. The story of the latter days of the drug-victim, his awful anguish, his unspeakable sufferings and the tortures of his remorse, has been told often enough, and we will not repeat the details, of which the recollection is sickening even to one who has witnessed them many times.

The decline of physical strength may be long delayed if the daily dose of opium is kept down to a minimum, but the downward progress is certain, and the patient gradually drops out of the activities of life and sinks into chronic invalidism.

But the most remarkable effects of opium are those it exerts upon the tissue metabolism. At first there is a decrease in the excretion of toxins, which appear to be retained in the cells. This retention, however, soon reaches the saturation point, when the cells can retain no more. The decrease in the patient's physical activity and in his use of food appears to be in one sense conservative, as the destruction of nutritive material and the formation of toxins is thereby reduced to that minimum which the organs are still capable of performing and the cells gradually become accustomed to carrying on their work

in this manner. They get in the way of doing but little work and of throwing off simply the extra portion of the toxins formed, as an over-fed babe ejects the milk from its esophagus, leaving the stomach full. Moreover, for even this minimum of work they are dependent upon the stimulus to the nerves afforded by the opium. The bodily functions become so attuned to the morphine key that they can make nothing but discords in any other. The significance of this becomes manifest when the drug has been discontinued, after the withdrawal period has passed and the patient has for some time been trying to live without his drug.

One result of this locking up of excretory matter in the body is an increased liability to disease and to grave consequences following injury. Abscesses form readily and are slow to heal. Influenza, pneumonia and intestinal affections carry off these unfortunates, when healthier subjects would recover.

Finally, opium has a singular effect upon the course of diseases existing at the time the habit began. Frequently the drug has been first employed to relieve the pangs of neuralgia, of dysmenorrhea, or of one of the numerous forms of myalgia. The pain is relieved at the first, but it returns with certainty at the usual time, or when the effect of the opiate has worn off. Thus it appears that opium checks the natural evolution of the disease by which it would otherwise work its own cure. The malady is crystallized, as it were, and prevented from either running its course or getting well.

A lady had had repeated attacks of dysentery, for which she took laudanum. This kept the bowel affection in check, but it reappeared whenever the effect of the laudanum wore off. We found that her bowels were loaded to an almost incredible degree with feces, and it required the utmost care to dislodge the deposits without setting up an inflammation of the bowel. The dysentery was simply an effort of nature to get rid of the real difficulty, and this salutary effect had been prevented by the use of laudanum, which always relieved the pain and soothed the irritated bowel into quietude.

We are now prepared to consider the question: "What is to be accomplished by treatment?" The objects of judicious medication are (1) to enable the patient to discontinue the use of morphine safely; (2) to diminish the suffering incident to withdrawal; (3) to treat any coexisting or underlying disease; (4) to enable the patient to live without morphine subsequently and prevent a relapse into the habit.

We have already mentioned the fallacy of the advertisers who "cure" morphinism by eliminating the drug from the system. Another equally

erroneous idea prevails that a cure means to take away the craving for the drug. Some persons who have observed cases of alcoholism, in which the patient has an unquenchable thirst for alcoholic pharyngeal irrigation, proclaim their ability to cure morphinism by removing the craving for the drug. In fact, no such craving exists. The drug is stopped and eliminated, and nothing but loathing is felt for it, but the overwhelming need comes on to force the patient into using it. This, however, the advertiser has not promised to remove.

For the first indication, that of enabling the patient to discontinue the drug without danger to life, it is necessary first to study the case. The patient should be stripped and examined thoroughly from head to foot. His general physique, marks of previous disease or of morbid tendencies should be noted. The functions of the brain, lungs, heart, digestive and eliminative systems should be carefully scrutinized, the abdomen palpated for impactions and the urine tested for albumen, sugar, total solids and eliminative capacity. During the withdrawal the heart is apt to fail if not properly strengthened beforehand and watched closely. Severe diarrhea or dysentery will certainly occur if not prevented by suitable treatment. The kidneys may refuse to eliminate without the controlling influence of morphine, and uremia may occur. Autotoxemia is a certainty and must be reduced to the lowest possible point. And when it has been allowed to occur, it brings with it melancholy, in the form of a settled conviction that the whole thing is useless, that life is not worth living at the best and death a certainty in the near future, and it is best to take enough morphine to enable one to settle up necessary business matters and then quit. But when the body is again saturated with the drug the morale is restored, and the patient then desires as ardently as ever to break his chains.

The relief of the suffering occasioned by depriving the patient of his accustomed drug is the second object of treatment. Much may be done in this way; so much that it is often a question if we are not doing too much, as the patient may be encouraged to return to his habit in the confidence that he can be so easily cured.

This parallels the drunkard who is so easily delivered from the horrors of delirium tremens that he goes gayly back to his potations in full confidence that "Doc will pull me through." (Our apologies to those who object to the familiar abbreviation, but it is the way he says it; for the inebriate has no respect for aught on this mundane sphere, and would address the President as "Old Hoss.") But cases differ. There are young and healthy men who have so little excuse for their drugging that one feels that they ought to suffer the full measure of



the withdrawal pangs. We have profound sympathy with misfortune, but none for "pure cussedness." But when we deal with an old and broken man, when we seek to remove the prop on which he has learned to sustain himself, we must go easy; we must be most merciful, and only slip away the crumbling staff as we transfer his grip to a stronger, more enduring support. Nothing is more touching than the confidence with which one of these noble martyrs says: "Doctor, I will bear all my suffering with fortitude, for I know you won't let me suffer more than is absolutely necessary." One feels like bringing every aid that experience can supply to save such men every pang; and it is one of the pleasures of life to have one of them realize with surprise that the dreaded ordeal has slipped by while he has been still looking forward with anxiety.

Many morphinists have underlying disease, perhaps unsuspected masked by the drug. It may be neuralgia, dysmenorrhea, diabetes, dyspepsia, or other disease that may fairly come within the reach of curative treatment. But suppose it is cancer, tuberculosis or mucous colitis? What becomes of the "sure cure" guaranteed? The quack does not guarantee to cure these diseases, he only cures morphinism. But the only thing left for such unfortunates is to go back to the drug as quickly as possible, for in these affections morphine alone makes life bearable. And it really seems to hold the disease in check, for it will progress rapidly when the drug has been withdrawn. The only effect of treatment in such instances is to transfer the patient's money to the quack and subject the victim to the misery of a useless and exhausting ordeal which he never should have been permitted to undergo.

And when all these things have been done and the patient has been relieved of the drug, has regained his normal health and is well, fat and happy, eating voraciously, plunging into his tub of cold water with a delight he would not have believed possible, and enjoying the exquisite sense of rejuvenation that follows the reaction, the hardest task of all yet remains: that of enabling the patient to live without his drug. The chains of habit are strong. When for years one has accustomed himself to innervation for a bad surgical operation his hands will travel unconsciously towards the hypodermic syringe, and he will have the "shot" prepared before he realizes what he is doing.

And metabolism lags. The functions are performed languidly, and toxins are imperfectly eliminated. The body-organ has been attuned to the morphine key and makes nothing but discords without the master's touch. Toxins accumulate, and digestion, assimilation and nutrition are sluggishly accomplished. Ashes form over the glowing embers. Oxygenation is imperfect and the temperature falls below

normal. Spasms of some portion of the respiratory apparatus occur; hiccough, tonic spasm of the diaphragm or of the glottis; palpitations and spasmodic pains around the heart frighten the patient with the idea of angina pectoris; and a person is only too apt to seek relief where he knows it can be found. The habit of "bracing" before undertaking any task becomes a second nature, and it is sometimes a difficult task to teach a patient that he must rely on his own unaided powers in all the emergencies and vicissitudes of life.

**Treatment:**—We approach this part of our subject with reluctance; as it is difficult to give anything like a really clear idea of a treatment that will be applicable to the generality of cases. We have several times believed that our treatment was systematized, but it has proved that this was an error; the cases we had treated were exceptional, and the treatment that had succeeded with them proved useless in the subsequent trials made with it.

The first essential is getting control of your patient. This must be absolute. Unless he will surrender to you the control of his morphine supply, you may as well stop right there, for you will not accomplish anything. In most instances we leave some morphine in our patient's possession, as he is apt to be nervous and panicky without it. It is a comfort to him to know that if he is too hard pressed he has the means of relief in his possession; and animated by that knowledge, he will ask himself the question whether he is really suffering more than he can endure, and conclude that he will "stick it out" a few hours more, then another hour, and another, until the crisis has passed; he falls asleep and awakes to find that the dreaded ordeal has passed, and that he has gone through it by the aid of his own will. And so he has learned the lesson of self-confidence; and in this we see the beginnings of that only true cure, that lies in the restoration of the power of manly self-control.

"Resist the devil and he will flee from you," says the great Book; and true it is that the tempter is but a cowardly, bully when he is faced boldly.

But to some persons the possession of morphine is not a comfort but an annoyance. The thought of it will keep them awake; they will lie in bed thinking about it until the desire for it is too strong to be resisted. They are like the toper who would not buy a jug of whisky to carry him over Sunday, because he could not sleep if he knew there was whisky in the house. Such men voluntarily place their morphine in our hands and say they will feel easier if they know they have none and can get none.

Besides this, the urine should be tested every day, that the surreptitious taking of the drug may be at once detected. Drop a grain of



Merck's neutral chloride of iron into the urine; the depth of the green coloration will show the quantity of morphine that is being eliminated.

If, however, the powerful influence of hypnotic suggestion can be exercised over the patient, the course will be easy and agreeable; if not, there will surely be a struggle, an ordeal through which the patient must pass to win his freedom. Be not deceived; there is no shirking the conflict. If the patient declares he has been cured without suffering, the curative influence has been suggestion, or he is still taking morphine, or else he lies. We have had abundant experience of each.

The next step is to go over your patient thoroughly and see what kind of a man he is. Examine him as to his general physique, and then review every function of his organs. Quite often you will find a state of debility that requires reconstructives at once; and it is best to begin this treatment before seriously attacking the habit. Add to this efficient treatment of anything that may be found out of order, no matter how inconsequent it may appear. We can give no specific directions here; the skill of the physician alone can guide him.

In every solitary case the bowels are packed with feces. Give ten grains of calomel or twenty of blue pill, followed by saline laxatives, repeated every hour or two until the bowels have been thoroughly emptied. An enema or two of hot water, passed up beyond the sigmoid flexure, will aid materially.

Having emptied the alimentary canal, keep it clear by the cathartics mentioned, and render it aseptic by the use of intestinal antiseptics you prefer. From six to twelve of the W-A tablets daily will accomplish this object, and these must be continued throughout the whole course of treatment, giving just enough to render the stools inodorous.

Keep the patient as quiet as possible, preferably in bed, as the distress is brought on or aggravated by exercise. Let the food be such as the patient prefers, light, nutritious but digestible, with an abundance of fresh fruit juices, and of salt. Have a capable attendant ready at all hours of the day and night to give a hot or cold bath, with massage, whenever the patient's restlessness demands it. Pain, burning and nearly all the real suffering, went out when intestinal antiseptic was instituted, but there remains the nervousness, sense of "goneness," the "new" or naked sensitive feeling, which is largely suggestive and is best relieved by hydropathic measures.

The cold bath is best reserved until the crisis is over when the patient has had no morphine for forty-eight hours. Then the cold shower, douche, plunge or pack will bring about reaction better than any other remedy.



The cold bath should be so administered as to bring about reaction—a quick plunge into the tub and instantly out again, followed by brisk rubbing, slapping, hot drinks, such as capsicum tea, and wrapping in warm blankets. The first drug-free sleep usually comes after such a bath.

The morphine is to be reduced as rapidly as the patient's condition allows. Young and sound individuals, and the self-indulgent whining weaklings, should be cut off short; but with older or broken-down men, one must be most careful and most merciful.

When the reduction begins to be felt, one or another of the special agents may be employed to mitigate the suffering. Codeine is hardly of value except where its use is gradually substituted for that of morphine. The same may be said of narceine and cannabis indica. The bromides interfere with digestion, causing an extraordinary fetor of the breath, so that they do more harm than good.

Physostigmine gives the most perfect relief in some cases, especially those showing passive congestion of the face, with dilated capillaries.

Strychnine relieves others singularly, especially when the relaxation and debility are great. This drug must be given in doses that will produce their effect, no matter how large; but some cannot bear more than gr. 1-100 at a dose.

Quinine, in doses of gr. 10-40, daily, also relieves some cases; but we have not been able to specify them.

To secure sleep we employ hyoscine, gr. 1-500—1-100; after two days substitute passiflora, lupulin, cypripedin or scutellarin, caffeine valerianate often answers well.

The heart must be watched constantly and any evidence of weakness or irregularity met by digitalin, sparteine or cactus, in sufficient doses. These drugs then produce sleep better than the regular hypnotics. Pettet gives sparteine in two-grain doses by hypodermic.

Never give a second dose of hypnotic the same night; if you do, the patient will never again fall asleep till he has had his second dose.

Change the hypnotic nightly.

As general tonics, hydrastis, cinchona, avena, passiflora, arsenic and iron may be variously combined.

Pettet has called attention to the great value of sparteine when given hypodermically in doses of not less than two grains to an adult. This exerts little tensile force on the blood-vessels but aids the heart materially. Hyoscine has been advised in doses of gr. 1-200 to 1-50, repeated every half hour so as to keep the patient stupefied till the withdrawal period has passed. We have had no experience with this method and

will have none. As we have attempted to show, the principle on which it is based is an error, and the method is too dangerous for us. Hyoscine as a hypnotic in suitable doses is our main reliance, but this continuous stupefaction is only a variation of the chloral method herein described.

The approach of a relapse is heralded by dyspnea, aches, and especially by subnormal temperature. We regard this as evidence that intestinal autotoxemia is present and that metabolism is deficient. Clear the bowels by the usual means and give the patient nuclein solution up to a dram each twenty-four hours, to arouse the vital powers and incite metabolism. This remedy should be given throughout the treatment, hypodermically, in ten-drop doses every four hours, as it greatly relieves the withdrawal symptoms and sustains the patient. If the patient has used cocaine also, we usually combine brucine gr. 1-40 to 1-5 with each dose of the nuclein, brucine sustaining like strychnine and being also a powerful local anesthetic.

Relapse is most apt to occur about seven months after the cure. Constant, intelligent supervision of elimination is the best means of prevention. Strongly neurotic patients need to live under medical advice, and often a course of neuro-lecithin is of benefit, with strychnine and caffeine valerianate for the props, if some are unavoidable. These neurotics are always troublesome problems, but whenever the world adopts Spartan methods of dealing with them, physicians will become superfluous.

## LEAD POISONING

The persistent absorption of small daily doses of lead causes grave disorders. The muscles are atrophied, pale-yellow, the connective hyperplastic. Arteriosclerosis develops. Parenchymatous neuritis affects the peripheral nerves, with degeneration of the ends in the muscles. This process may extend to the anterior spinal roots, less marked as the periphery is remote. Cerebral lesions are limited to the vessels, with slight meningitis, connective hyperplasia and capillary hemorrhages. Cirrhosis affects the liver and kidneys.

**Etiology:**—There is a difference in the susceptibility of individuals; women are more liable, but the occupations of men expose them more. All workers in lead are liable, especially during their early years when they are heedless. The metal is most frequently carried to the mouth by the hands, workers neglecting to wash before eating or helping themselves to tobacco with paint-covered fingers. Among lead-users Anders enumerates painters, plumbers, lead miners, sheet-lead rollers,

potters, type founders and setters, shot makers, glass grinders; dress-makers, lace weavers and other operatives who bite off the ends of lead-dyed threads, and calico printers. Many accidental contaminations of food have been reported. Flint's celebrated case was an epidemic that resulted from a miller who had mended holes in his millstones by filling with melted lead. Stewart unearthed a widespread prevalence of lead poisoning in Philadelphia from the use of chrome-yellow to give a rich color to buns and other bakery products. Cheap candies are sometimes colored with saturnine dyes. Tobacco sold in lead wrappers is a danger; lead water tanks or pipes, milk cans, and other receptacles for foods may be sources of poison, especially if the contents contain acids that will dissolve the lead.

Lead poisoning usually occurs through the mouth and stomach, less frequently by the lungs, rarely by the skin. Hair dyes sometimes cause it. The metal is deposited mostly in the nerves, muscles and liver. It is eliminated by the kidneys, slightly by the bile and saliva, very slightly by the skin. Unless hastened by treatment elimination is exceedingly slow and never perfect.

**Symptoms:**—These are slow in development. Anemia gradually appears, the red cells and hemoglobin decreasing *pari passu*, leucocytes multiplying, the former pale and degenerated, while nutrition is impaired. A lead line appears along the margin of the gums, of lead sulphide, if the gums are slightly separated from the teeth (Gowers). Bluish patches are sometimes seen on the mucosa. Severe attacks of colic occur about the navel, with griping; the abdomen is retracted and hard, the bowels constipated, vomiting is usual; a dull pain is constant with paroxysms of severity during which the pulse is tense and the heart weak.

Lead palsies, acute, subacute and chronic are common; most frequent in the forearm extensors, causing wristdrop. Muscular tremors also occur, coarse or fine, beginning in the hands and aggravated by voluntary movement. Muscular cramps are common, about the joints, with anesthetic patches occasionally. Cerebral symptoms are plentiful, such as delirium, coma, aphasia, neuroretinitis, convulsions, hemiplegia, amaurosis, hysteria, and mental derangements. Hemianopsia has been noted. Severe headaches are common. Gouty attacks may occur. Symptoms in time result from the renal cirrhosis, cardiac hypertrophy and arteriosclerosis. The urine shows the presence of lead, which will be deposited on a strip of magnesium laid in it. The addition of ammonium oxalate, 1 part to 150, facilitates this test (Abram).



**Diagnosis:**—This is easy if the history indicates lead, but in many instances there is nothing to direct attention to the possibility of the cause of the symptoms. When Stewart had announced the discovery of lead in buns many physicians recognized among their patients cases of saturnism not previously suspected. The excitement died down, and very probably the colors are now used as freely as ever, and will be until some one rediscovers this cause of many obscure ailments. When the wristdrop, blue line, colic and cachexia are recognized the diagnosis is obvious. In less marked cases an examination of the urine for lead will reveal the difficulty. Punctate basophilic degeneration of the red cells is a characteristic.

In the earlier stages the prognosis is good; the material lesions of the kidneys, heart and vessels are permanent. Profound paralysis with reaction of degeneration and primary muscular atrophy, the severe cerebral cases, offer a bad outlook.

**Treatment:**—Lead poisoning in the arts is to be prevented by instructing workers on the necessity of keeping the lead out of their mouths and lungs, by scrupulous cleanliness, and refraining from chewing tobacco until it can be handled with clean hands. Respirators are useful to intercept lead-contaminated dust. Ventilation and means of carrying away the dust are better, since the respirators soon become so clogged that the careless workman casts them aside sooner than spare time for constant changes. The use of sulphuric acid is a good preventive, changing the lead to an insoluble sulphate. Milk is also advised for this purpose.

The iodide of lead being readily soluble, the use of iodine is recommended to carry the metal out of the system. When lead has been deposited, its solution is accomplished very slowly, and persistence in treatment alone offers a chance of success. The first effect may be a return of active toxic symptoms, as the dissolved lead is taken up by the circulation. The most active forms of iodine are preferable, such as calx iodata, which parts with its iodine more readily than do the fixed iodides. The doses should be moderate at first, and at the appearance of saturnine symptoms be suspended for a time. Ten grains a day in divided doses may be assumed as the average adult dose. The effect will be enhanced by keeping up elimination so that the lead iodide may be promptly ejected from the body. Warm baths with sweating, cholagogues, pilocarpine every other evening, and especially free flushing of the kidneys with saline solution thrown into the colon, are efficacious. As a cathartic alum has proved effective, its astringency relieving the paresis to which the constipation is due.

The treatment of lead colic calls for morphine and atropine hypodermically to assuage pain and relax spasm; saline laxatives, with warm colonic flushes, and alum or sulphuric acid to render lead still in the alimentary canal insoluble.

Anemia requires iron, paralysis strychnine and electricity, vascular tension veratrine—and ever and always, elimination.

### ARSENIC POISONING

Degenerative neuritis affects the peripheral nerves and the anterior horns of the spinal cord. The chronic form is here considered.

**Etiology:**—Neurotics, the numerous class who constantly feel the need of something to bring them up to the sense of healthy well-being may take arsenic for this purpose. Many women take it for its supposed value in improving the complexion. In the arts arsenic poisoning affects miners of arsenic-bearing ores, dyers, wall-paper makers and handlers, artificial-flower handlers, shot and glass workers, and taxidermists. Some persons are very susceptible to arsenic and show paralysis after taking it medicinally for brief periods. Persons living in rooms adorned with arsenic papers or carpets, or working with toys, ornaments or curtains impregnated with arsenic colors, are occasionally found to be suffering this intoxication. Special susceptibility probably exists, as practically all modern wall papers are tinted with arsenic.

**Symptoms:**—Dryness and irritation occur in the eyes, nose, throat and larynx; gastrointestinal catarrh arises, with anorexia, nausea and diarrhea; anemia and emaciation appear; the eyelids are irritated; discomfort is experienced in the stomach; the hair grows thin; dysenteric attacks occur, and sometimes numbness or tingling in the extremities. The skin may show dark pigmentation or various eruptions, generally of the scaly forms. The kidneys are irritated and blood and albumin appear in the urine.

Multiple neuritis develops, first in the leg extensors and peronei, later in the arms; contractions occur in the legs, tremors in the arms. Headache, vertigo, melancholy and nervous unrest sometimes are present. Remarkable toleration is manifested by some individuals, and in some it causes a singularly beautiful wax-like complexion, plumpness and bright eyes adding to the cosmetic effect. This is quite exceptional, and as a rule the use of this drug does not benefit the appearance but rather imparts a mulatto tint to the skin.

The diagnosis is easy when the existence of the trouble is suspected. Chemical examination of the urine detects the poison. The prognosis

is good when the case is early recognized and the patient can be removed from arsenical influences.

Abstinence from arsenic, removal of toxic papers, carpets and curtains are followed by improvement. Calx iodata, ten grains a day, will dissolve the poison out of the tissues and free elimination will carry it out of the body. Remedies are to be applied as the symptoms dictate. When fatty degeneration has progressed it may possibly be arrested by the use of neurolecithin.

## MERCURIAL POISONING

The continued ingestion of mercury causes toxic manifestations, varying with the susceptibility of the patient. The effect of the metal is manifested in the mouth and stomach, later in the kidneys, and probably in the brain.

**Etiology:**—The excessive administration of mercury is now rare. Its vapors are inhaled by miners, smelters, mirror silverers, and those working with amalgams, barometers, thermometers, felt hats, vermilion pigments, and artificial teeth. The poison enters the body through the alimentary canal, the lungs or the skin. Women and children are more susceptible than men. The mercury exists in the tissues as an albuminate.

**Symptoms:**—The teeth feel too long and are tender, the gums swell, catarrh of the mouth occurs which may proceed to ulceration and loss of the teeth or even necrosis of the maxillæ. The tissues generally show the solvent action of mercury, exudations and the debris of inflammations are absorbed, slight fever occurs, all the secretions and excretions are increased, and a general stimulation of the functions, bodily and mental, occurs. Tremors follow and paralytic symptoms. Fine tremors appear in the tongue and lips, growing coarser, extending over the voluntary muscles. They cease during sleep and are worse on motion. Speech is affected. Irritability exists, aphasia may occur, or hemiplegia, hemianesthesia, peripheral neuritis, with pareses, joint pains, various cerebral symptoms, insomnia, hallucinations, delirium, coma, convulsions, headache, loss of memory or some form of mental derangement. Albuminuria or anascarca may follow. Children born of salivated mothers are apt to be weak and ill-developed, falling prey to tuberculosis readily.

The diagnosis is easy when the history is perfect. Progressive general paresis, disseminated sclerosis and paralysis agitans are to be differentiated. Recovery usually ensues if the poison is removed.



**Treatment:**—Stop the mercury; eliminate what has been taken, by the use of calx iodata as described for lead and arsenic. Mercury is more readily dissolved out, yet time must be allowed for complete eradication. Atropine checks the salivary symptoms. Hydrastine forms an excellent lotion for the mouth, a grain in an ounce of water used frequently. Tonics may be given at once with the iodine; in fact iron iodide is useful, the iron restoring the blood while the iodine is carrying away the poison. The paretic manifestations call for strychnine in full doses and various applications of electricity. Sometimes when any tissue shows the destructive effects of mercury, and it is an even thing if the vitality will or will not be retained, local applications of neuclein solution will turn the scale in favor of the vital forces and save the imperiled structures.

### PTOMAIN POISONING

The general use of canned meats and other foods has vastly increased the number of instances of poisoning from these articles when in a state of decomposition. Even when the proprietors and managers of packing houses do their best to prevent the packing of unwholesome articles, there is always the danger that employees who have permitted foods to spoil will endeavor to conceal their carelessness by slipping the decomposing material past the inspectors. The result is a general suspicion of canned foods that greatly interferes with the use of them, and limits the application of a method of preserving surplus foods and transporting them safely, that would else be one of the greatest boons humanity has received from modern science. Famines would otherwise be a thing of the past, for in all cases there is somewhere an abundance of food to spare, if it could only be preserved from spoiling until transferred to the region of scarcity. But this golden ideal is dissipated—by the carelessness of employees and the greed of employers. No intelligent man ever opens a can of meat or fish without scanning it for evidences of decomposition, or partakes of it without some apprehension.

Foods may be toxic through infection of the animal or plant from which they are derived, by the access of microorganisms before the food is eaten, or by the action of toxicogenic organisms after it has been eaten. Tuberculosis, anthrax, glanders, trichina, pleuropneumonia and other diseases of animals are transmissible to man in the infected flesh. Meat and milk carry diphtheria and typhoid fever absorbed from their surroundings, or in them toxins develop from the action of germs not

themselves directly pathogenic. Some saprophytes can live in the body and acquire noxious powers there (Novy). Toxins developed in foods by saprophytes are termed putrefactive alkaloids; bacterial proteid products are toxalbumins or toxalbumoses. All may be absorbed from the alimentary canal.

The summer diarrheas of infants are due to milk infected by saprophytic products, among which is tyrotoxin. This does not lose its toxicity by being passed with the milk into cheese or any articles of food prepared from milk by cooking. It causes acute gastrointestinal inflammation, constriction of the fauces, headache, convulsions, chilliness with great depression and purging. If continued, exhaustion supervenes, and subnormal temperature, collapse, coma and death. No antidote is known. The vomiting is relieved by minute doses of calomel, gr. 1-20 to 1-10 every half hour, with a grain of some mild soothing agent, like bismuth or chalk. Follow with a sweep-out with castor oil or similar laxative, and disinfect the bowel with the sulphocarbolates in sufficient doses. Atropine hypodermically is the remedy for collapse and excessive discharges, and the weakness may require strychnine in doses suited to the age and the need. Flushing the colon with zinc sulphocarbolate solution, a grain to the ounce, aids elimination.

Tainted meats are not rendered innocuous by cooking. They cause infections only when not thoroughly cooked, or ptomaine poisoning whether raw or cooked. In the latter case gastroenteritis results, with violent retching and vomiting, intense colic, purging of choleraic type, fever, weak and rapid pulse, nervous and muscular prostration, cramps in the calf muscles; and in extreme cases the temperature becomes subnormal, great exhaustion is manifest, with dyspnea, somnolence, sore mouth, collapse and even death. There is sometimes a close similarity to arsenic poisoning, but Harrington mentions three points of difference: In arsenic poisoning the patient swallows because of pain; the pupils are not dilated or the muscular prostration as extreme as in ptomaine cases.

Fish and shellfish frequently cause poisoning. Some of these contain toxic principles, others are themselves affected with disease which is transmissible with their tissues to the eater. The sturgeon and the salmon are sometimes diseased, as eaten in Russia. Brieger discovered mytilotoxin in certain mussels which cause epidemics occasionally. The conditions that cause these foods to be toxic at times are not understood, since the symptoms may occur after eating them when undoubtedly undecomposed. Generally, however, the trouble may justly be attributed to canning the fish after decomposition has com-

menced. The symptoms are often those already described as caused by bad meats. Sometimes the toxins affect the brain, causing convulsions, paralysis, etc. Symptoms of collapse accompany and terminate the malady. Irritations of the skin occur in less serious cases, as urticaria, pruritus, erythema, etc. Grave cerebral symptoms or collapse are serious prognostics. The treatment is that described below.

The use of rye containing ergot has resulted in serious symptoms. This happens in lands where cultivation is backward, as in Russia and Spain, and where the people are so poor that even diseased grain must be eaten as preferable to no food at all. The symptoms differ according to the proportions of the different active principles present. If cornutine predominates we have the neural group, debility, tingling in the extremities, headache, followed by cramps and contractures, convulsions, delirium, dementia in chronic cases, and if death does not ensue a slow recovery diversified by anesthetics, persisting contractures and muscular atrophy. Ataxic symptoms sometimes occur. Pregnant women abort. If sphacelinic acid be in excess the gangrenous type is seen. Dry gangrene of the fingers and toes follows pains, formication, anesthesia and coldness. Fever may attend the separation. Septic pneumonia may end the case. Some epidemics are quite fatal. No treatment has been devised further than stopping the use of the diseased grain. Whether glonoin, veratrine or atropine would unlock the strangling grasp of ergot on the blood-vessels does not seem to have been tested. The nervous type calls for the most vigorous elimination, the forces being sustained by strychnine and perhaps by zinc phosphide.

Pellagra occurs in Italy from the use of diseased corn meal. Micro-organisms attack the fresh damp meal and develop ptomains. Its use causes debility, digestive disturbances, nervous unrest, and diarrhea. Erythema follows with pain and desquamation of the epidermis. Nervous symptoms sometimes predominate, headache, mental aberrations, delirium, spasms, pareses and suicidal impulses. Repeated attacks may result in idiocy or profound cachexia. Fatty degeneration and ulceration have been found in the intestines and some changes in the cord. No special treatment has been devised.

Three varieties of chick-pea or vetch cause, when eaten, stiffness of the legs and transverse myelitis, sensory and motor paralysis following. Contractures and exaggerated tendon reflexes may remain after the acute symptoms subside. Chronic cases may die in paralysis. The malady is known as lathyrismus.

Two poisons exist in mushrooms: muscarine, which is present in the fly amanita, and phallin, which is also found with muscarine in the



amanita phalloides. Phallin acts like serpent venom and causes profound vasomotor paralysis of the abdominal vessels, the blood collecting in them till fatal syncope results, and also causes liquifaction of the blood corpuscles. There is no known antidote, but strychnine should be pushed to toxic effect and this sustained. Phallin is a toxalbumin and is destroyed by cooking. Muscarine causes cardiac debility, free vomiting and serous diarrhea, both absolutely devoid of distress or pain. The face is marble-white and cold, extremities cold, pulse feeble and muscles weak, but the mind is clear and there is a remarkable absence of vertigo and faintness, as well as of nausea, considering the other symptoms. Muscarine is completely antidoted by atropine, which greatly excels the former in power. Muscarine passes out of the body by the kidneys so rapidly that it is very difficult to obtain a therapeutic action from it unless given in full dose intravenously. Death from muscarine could not occur after any dose if atropine is given in sufficient quantity. As phallin is destroyed by cooking, therefore it seems to follow that death from *well-cooked* mushrooms of any variety is impossible if atropine be in reach. The green russula and at least one boletus are toxic in less degree, and possibly other unrecognized fungi. It is safe for the lover of these delicious plants to reject any except varieties he has classified and knows to be safe. The true mushroom crank will eat all he does not know to be unwholesome, until he gets a lesson.

The variety that caused the symptoms above described was as large as a dinner-plate, and did not show the characteristics of the fly amanita though the effect proved the relationship.

## OBESITY

The increase of fat becomes a disease when it commences to interfere with the functions of the body. Excessive weight is less menacing to longevity than insufficient weight, since life insurance companies permit a much greater percentage of excess than of deficiency in acceptable risks. The fat is increased in its normal locations and the internal organs are overlaid and infiltrated with it. In the plethoric the fat globules are larger than in the anemic. The heart is especially overlaid and infiltrated. The arteries are fatty, with patches of inflammation on the intima, the veins varicose. The lungs become congested and edematous as the heart weakens, and as well as the liver, kidneys, etc., are infiltrated with fat. The stomach is often catarrhal and dilated.

The malady represents a disorder of metabolism and is often hereditary. Climate, habits, occupation, age, sex and temperament influence its development. Warm, low, moist climates, indolent habits, sedentary occupations, advancing age when the activity of youth is discontinued; in women marriage and childbearing, sometimes the menopause, and an easy philosophic temperament, favor obesity. Certain races seem predisposed, but this is probably due to the above influences. Direct causes may be found in excessive use of water and other beverages, an excess of fat-making elements in the food, alcohol, deficient exercise, and the enforced idleness following an accident.

*Symptoms:*—The advance of weight renders exercise more difficult, causes shortness of breath, in plethoric persons redness of face on exertion, in the anemic pallor with palpitation, weak pulse, somnolence and dizziness. The heart exhibits the signs of fat encumbrance. Many obese persons consume very little food, but they are apt to eat fast and masticate but little, washing the food down with much cold water.

The fat bear diseases and surgical operations badly, and are prone to excessive fever on slight occasion. The liver is enlarged, with soft edges. Pulmonary congestion induces a catarrhal tendency and cough on slight exertion. They sweat readily, excrete much uric acid, drink hugely, the bowels may be easily moved or show diarrhea, and the sexual function is often weakened or lost. Women are sterile, amenorrheic, with uterine derangements and frequently prolapse. The menopause is a season of distress. Intertrigo, eczema and pruritus are common, while hernia, asthma, respiratory catarrhs and inflammations, edema, arteriosclerosis, albuminuria, glycosuria, angina, Cheyne-Stokes breathing, apoplexy and coma are features of some portion of the course.

The diagnosis is as to the position and the effects of the deposits. The prognosis depends on the degree, the effects, the impairment of the heart and other vital organs, associated conditions, and the means and tractability of the patient. Obesity in itself threatens longevity; the habits and tendencies that lead to it are still more to be dreaded. The earlier in life it begins, the greater the danger and the difficulty in dealing with it, especially when heredity is decided. Beer drinkers' obesity is the most to be dreaded as the liability to sudden death is great, from the structural disorder of the cardiac muscle. Muscular overstrain is apt to cause apoplexy in the plethoric, syncope in the anemic. Exposure to excessive heat is dangerous to either class, the plethoric especially. Any intercurrent malady is likely to prove fatal to these persons. Even the plethoric bear venesection badly.

Von Noorden suggests that before beginning treatment it would be well to determine whether any treatment should be undertaken, and if so, whether we should attempt to reduce the fat already deposited or simply restrain the further deposit. Patients desire reduction from cosmetic considerations, or oppose the suggestion from the mistaken idea that a reduction process is necessarily weakening or endangers life.

Very advanced forms require treatment to prevent the consequences if the malady goes on. Before the twentieth year it is best to arrange the diet so as to prevent further increase in weight, and occasionally enforce a closer abstinence for a month only. In the aged, reduction-cures almost without exception accelerate senile decay and the decline of strength and functional activity. (Von Noorden.)

When the excess over the average for height is not more than 30 to 50 pounds, the case is more amenable to treatment. If no discomfort is caused and the growth is not increasing it may be wise to let it alone. Still, it is a source of danger when intercurrent disease appears and throws a strain upon the heart. The objection to interfering when age has advanced holds good here also, and with younger subjects the reduction should be gradual and carefully watched. A further increase should be prevented and the occurrence of obstructive symptoms renders reduction imperative. This is also the case when the habits and tendencies of the patient are such as to indicate that he will not so live as to prevent further increase of the difficulty.

The treatment may be opened by a quick reduction of 10 to 15 pounds, without injury; but the crux of the matter is reached by the prolonged action of the slower method, the more or less permanent restrictions which are far more difficult to enforce. Instead, the month's reduction is likely to be followed by an indulgence that soon restores the lost weight with goodly interest. With most patients the desideratum seems to be a remedy that will reduce weight safely without requiring any increase of exercise or forbearance in the way of eating and drinking. For these, Von Noorden advises monthly courses of treatment at varying intervals, followed by systematic exercises and skin stimulation in the intervals, with such restrictions as the patient can be induced to submit to. Much better results will be secured in a sanatorium than at the patient's home; and the laudable desire to get the worth of one's money indicates the wisdom of making the charges as high as possible. The regimen there enforced should teach the patient the better methods of living that may be practised after returning home.

Slight obesity, overweight of 10 to 30 pounds, does not require reduction methods but simple regulation of the diet, etc., so as to pre-



vent further increase. Whether the desire of women to retain their physical attractions can be justly attributed to "vanity," as Von Noorden assumes, might be ascertained by inquiring how much of a woman's success in her life-work depends on her looks. Since the régime that reduces weight makes also for health and longevity, the physician here finds his opportunity to inculcate the lessons of hygiene, with prospects of being obeyed. Slow reduction tends to remove fat uniformly, while the rapid processes do not apparently affect abdominal deposits. The loss of fat may not be an unmixed benefit, for women may suffer from constipation, hernia, gastropnoxis, malposition of the kidneys or the uterus, or gallstone colics may begin, the loss of fat having exposed the diseased organ to pressure. Abdominal massage may increase the loss at this point, and is specially valuable when intestinal atony has followed the reduction, as is frequently the case.

**Questions of Complications:**—Diseases of the heart or vessels, and of other parts, that also throw an increase of labor upon the heart, so that its strength is below the requirements for exertion made upon it, call for the reduction of fat. Every pound of useless fat increases the necessary and unavoidable work of the heart. Since we cannot hope to cure organic lesions it is all the more essential for us to lessen the work of the heart until we reach the balance between its powers and its labor. In fact, the presence of some obesity in heart-cases renders their prognosis more favorable. This matter is fully considered in the treatment of heart-diseases. Von Noorden advises that after ten pounds have been lost the diet should be relaxed so as just to hold the weight for a month; and then again reduced. Assistance is obtained from skin stimulation by cold baths, salt rubs, sitzbaths, prescribed exercises, douches and carbonated mud baths; and the process should be continued until the normal weight has been restored for the height and age.

To the patient with interstitial nephritis obesity is as dangerous as to him with heart-disease. The removal of surplus fat from chronic bronchitics markedly benefits these patients, while the limitation of thoracic space by fat deposits may render an ordinary bronchial attack fatal. Similar benefits follow reduction methods in chronic rheumatics, and other remedies will after reduction produce more decidedly beneficial results. Gout and obesity often coexist, and their treatment harmonizes. Such patients can take larger quantities of meats with impunity if they also take an abundance of vegetable foods. Of the three conditions, obesity, uricacidemia and the lame heart, the latter is the factor that will govern the methods of treatment to be adopted.

In a number of affections in which locomotion is impaired a reduction of the fat will enable the patient to get about with more freedom. Exercising and training the muscles will often be of decided benefit in addition. The paralyses come under this head, and other nervous affections may also be thus benefited, such as sciatica and other neuralgias, and hysteria. The relief that ensues is not easily explained, unless we adopt the view that regards neuritic symptoms as evidence of the leakage of nerve force, the insufficiency of the supply being manifested by that portion of the organism least able to attract to itself its full share. The heart may show no evidence of unusual strain because it robs some nerve (the brachial plexus perhaps), of part of its supply. Reduce the weight, lessen the demands upon the heart, and the lessened requirements of the selfish organ leave more for the suffering, starved nerve. At least this is a very convenient means of explaining many phenomena, better than the "reflex" theory, which is in fact no explanation at all.

A different state of affairs faces us in diabetics. They bear reduction methods poorly, and if the fat is not excessive, had better be let alone. But when the fat endangers life, and when the weakness of the heart is a perilous symptom, the fat must be reduced to a safer limit. The intermittent method is applicable, taking away two or three pounds by a limited diet, and this in about a month; repeating every three months.

How as to consumptives? There seems danger that the fattening of these may be carried beyond the bounds of reason. Obesity carries too many disabilities to render it advisable to persons whose hygiene requires such delicate adjustment. A generous fatness is desirable but not more. The reduction in such cases is a problem of much importance, the risks being great.

Reduction may be accelerated by adding the use of thyroid extract, in moderate doses. But in the vast majority of cases the method above described will reduce the weight quite as fast as is safe. However, the patient may urge a rapid reduction, and great as may be the fame thereby acquired by the doctor, there is rarely a case that is not best managed by limiting the wasting to a pound a week.

The effects of phytolaccin may not be evident until it has been taken for one to three months, when an active wasting may set in, and continue after the drug has been discontinued. We do not approve of any preparation of this drug for use by itself. As an ingredient of remedies for the reduction of superfluous and encumbering fat it is useful, but when given alone its effects may be manifested suddenly and with alarming vigor.

## SUNSTROKE

Under this designation two forms of disease are included, both in a measure due to exposure to the rays of the sun when excessively ardent, but differing in pathology, symptoms and treatment.

**Pathology:**—Rigor mortis and decomposition occur earlier than usual. There is engorgement of the brain and cord, membranes, lungs, spleen, conjunctiva; the blood dark and fluid, the red cells deformed. Extravasations of blood are found in the skin, serosa, and about the sympathetic ganglia, vagus and phrenic nerves. The left ventricle is rigidly contracted, the right auricle dilated. Van Gieson found acute parenchymatous degeneration of the neurons of the whole cerebrospinal axis, which he attributed to a species of auto-intoxication.

**Etiology:**—The persons who out of the population fall victims to sunstroke are those who have become debilitated by disease, privations, unsanitary surroundings, over-fatigue or emotional exhaustion, alcoholic, venereal or dietary excess. Men are more liable than women. Auto-intoxication from fecal absorption or renal, cutaneous or hepatic deficiency of activity, renders men exceedingly liable. To such persons, exercising under direct rays of the sun with temperature exceeding 90°F., when the humidity is high, or in closely confined and very hot places, there is danger of sunstroke.

Heat exhaustion occurs in fat elderly persons, who drink ice-water excessively, perspire freely, and eat little because their stomachs are disabled by the icy floods. Their "sunstrokes" are syncope.

**Symptoms:**—Heat apoplexy is rare. The patient may have warnings such as dizziness, chromatopsia, throbbing headache, dyspnea, or cessation of sweating. He may fall while at work, have convulsions, and die with heart-failure. More frequently the effect is not so profound, but the patient is restless, with cramps in the abdomen and oppression of the chest, vomiting, intense headache, flushed face, the pulse full, bounding and hard, respiration stertorous, arteries pulsating visibly, pupils contracted and bladder irritable. The skin is dry and hot, sometimes showing petechiæ, tongue white, temperature moderately high, normal or subnormal, but sometimes hyperpyretic. Wild delirium is an unusual feature. If the case progresses the coma deepens, the pulse weakens, and Cheyne-Stokes respiration appears before death. If recovery ensues the fever subsides and consciousness gradually returns. The "mousey odor" described as sometimes present is simply an evidence of toxemia.



More frequently to the symptoms above described is added hyperpyrexia in which the temperature rises to an unprecedented degree. The writer has registered 113 F., but this figure has been exceeded. Death is not long delayed if the brain is not quickly relieved from such a strain.

Among prodromes noticed—which may or may not signify the approach of sunstroke—are anorexia, growing debility, abdominal cramps, nervous unrest and temper, vertigo, blurred vision with disturbed color sense, bursting headache, irritability of the bladder, and most ominous of all, stoppage of sweating. Such symptoms spell danger especially to the man whose blood-vessels are diseased, kidneys or liver deranged. The patient may go on about his occupation in a mechanical, automatic manner for some hours before the stroke occurs with symptoms as above described. Hyperpyrexia is present at the start, clonic spasms alternate with muscular rigidity or relaxation of the bladder and rectum may act from spasmodic contraction, and the rate of respiration keeps pace with the fever and pulse. Alcohol users are prone to retention or suppression of urine (Anders.)

Leucocytosis has been found. Complications that usually prove fatal are pneumonia, meningitis, uremia and paralysis of the heart and lungs.

Heat-exhaustion usually has for prodromes dizziness, fainting, headache, nausea, thirst, drowsiness and yawning, lumbar aching or gastric pains, numbness and tingling of the extremities, and the general evidences of gastric atony and cerebral anemia. The patients cannot eat, but drink drink, drink, drink! The attack is characterized by a cold, clammy skin, great prostration with complete relaxation of the muscles, the pulse weak and fluttering or almost imperceptible, never wiry, sighing respiration, syncope, subnormal temperature at first, and all the symptoms of a collapse that may prove rapidly fatal if not promptly comprehended and remedied. Consciousness is not usually completely lost, and soon returns. Recovery from the first shock soon follows, but the weakness remains long.

Persons who have suffered a true thermal stroke are sometimes peculiarly sensitive to heat thereafter and have to "follow the snow line." Various anesthetic and neurotic manifestations may follow, especially when the patient is exposed to heat, and these may indicate chronic meningitis. In all cases of this malady the patient requires watchful care for a prolonged period and he may never be able to again endure great heat, or even the direct rays of the sun, without suffering or danger.

**Diagnosis:**—In true sunstroke we have hyperpyrexia and muscular rigidity, with unconsciousness as a rule; in heat exhaustion, alcoholic or opiate coma, there is a temperature not above and often below normal, muscular relaxation, and a pulse not the forcible one of sunstroke. In apoplectic paralysis the rigidity is one-sided, the temperature normal, in meningitis and uremia the symptoms are too widely different to occasion difficulty. The coexistence of uremia should be considered.

**Prognosis:**—In heat prostration this depends on the treatment. In true sunstroke we have to consider the previous health and habits, the height of temperature and severity of the symptoms, especially those indicating the degree of damage inflicted on the nervous centers, and the complications. Very hot humid weather increases the tendency to death.

**Prophylaxis:**—Persons whose bodily state renders them specially liable to heat-strokes must be warned of their danger and urged to keep out of the sunlight during the hours of its intensity, to avoid over-exertion and excitement, and the use of stimulating food and drink. Keep the bowels open and the head cool; see that kidneys and skin eliminate freely; dress to suit the weather rather than the fashion; eat just enough, and drink freely but not to excess, preferring cool but never iced drinks nor alcohol. Physicians and others can often do their work largely during the earliest morning and late evening hours, resting at home in the cool, well-ventilated and darkened cellar from 11 a. m. till 4 p. m. Employers might so arrange the working hours of their employees. Fat people must learn to let the ice-water cooler alone and drink moderately, after a sufficient meal of solids. Excessive thirst and sweating may be checked by a little phosphoric acid and agaricin in the water drank; acid enough to suit the taste, not sweetened, and a grain a day of agaricin. To this may with benefit be added a grain of berberine.

**Treatment:**—In cases of heat prostration lower the patient's head, loosen the clothing about the chest, and at once slip a granule of glonoin into his mouth telling him to chew it. Repeat this dose every five minutes till his face flushes, meanwhile giving the same dose, gr. 1-250, of atropine to sustain the derivation of blood to the brain, repeating the atropine every half hour till the mouth dries. The heart needs help, but this is a case that may easily be over-stimulated. Give brucine gr. 1-67 with each dose of atropine until the pulse approaches normal tone, and then less frequently. Perfect rest should be secured for the day, all friends excluded and if possible a trained nurse put in charge. The diet should consist of small portions—four ounces—of the most easily digested and nutritious foods, given every four hours, night and day. Soused pigsfeet, any other jellied meat, beef-powders or raw blood fluids, the predigested

foods and the much-abused breakfast foods, are here useful. These may be alternated or accompanied by hot strong coffee and cups of fresh fruit juices. If there is marked heart-weakness massage and graduated exercises may be required before the patient is permitted to return to his occupation. We are well aware that the textbooks do not make so much of this malady, and pay scant attention to it; but a single case of fatal syncope, the patient rising to urinate an hour after his collapse, is enough to impress the physician with a sense of the danger of underestimating this condition.

The hyperpyrexia cases require the instant, wholesale and unremitting application of cold, as quickly and as generally as the circumstances allow. Affusions can be given wherever there is water, and even if the water is warm it abstracts some heat. Pack ice about the head and body, wrap in sheets wrung out of cold water and fan, throw ice water into rectum, in fact apply any form of cold that is most speedily obtainable and keep it up till the fever sinks to a safe limit—below 105 F. Bleeding may be necessary if cold can not be applied soon enough, the effects to be watched with the finger on the pulse, the patient sitting up, and neither too much nor too little blood taken to do the work. We may even be compelled to “bleed down to the brandy point”, and then bring up, not with brandy but glonoin, and strychnine hypodermically. We can not endorse the advice to apply cold till the temperature falls to 102. Perilous collapse may follow pushing this application too far, and in one of the charts with which Anders illustrates this subject the temperature fell under ice baths from 107 to 95 F. Temperatures under 105 F. do not threaten speedy death from paralysis of the brain, but may be controlled by ordinary means; this is therefore our limit for the application of cold. If the temperature rises above 105 the cold should be re-applied. In the days when no distinction was made between heat-exhaustion and true sunstroke, bleeding was applied to both conditions, with fatal results as to the former. It is rarely required when efficient applications of cold can be made, but when none of these is available venesection becomes our principal means of relieving the brain from a strain the delicate cerebral tissues are not calculated to long withstand. The abstraction of blood from a full-blooded, beefy man is a trifle anyhow, and now that the superstitious dread of depletion has subsided we may hope to see this potent weapon restored to the hands of the profession.

The use of sedatives such as aconitine and veratrine comes later, in the period of febrile reaction, when they spare us the difficulty that may attend the applications of cold in places unsuited for such care. Either should be given in the usual manner, very small doses very frequently



repeated until the desired effects are manifest. Precautions should be taken to keep the patient quiet, his head cool and him well shaded, as long as the temperature is above normal. The diet should be light and unstimulating, barley or rice water, cold consomme, water ices, iced coffee in very small doses, eggwhite water, buttermilk, junket, fresh fruit juices, in four-ounce doses every four hours, with bits of ice to be sucked when thirsty. The bowels must be thoroughly emptied by full doses of calomel and jalapin, a grain each, repeated, or by the speedier cathartics like elaterin if the need is pressing. After this the salines with an evening dose of calomel or podophyllotoxin, and an occasional colonic flush, will do well. The renal elimination must be sustained from the start, and half-pint colonic enemas of saline solution may be early advisable, as suggested by Packard. Bryonin is a good selection here, or apocynin if the heart is weak. Of the former gr. 1-67 every two hours, of the latter gr. 1-12 at like intervals, will usually accomplish the purpose.

If free perspiration does not ensue after reaction sets in it should be aided by pilocarpine hypodermically, gr. 1-6, repeated if needful. Hypodermics of morphine have been highly recommended for controlling convulsions, but if this be a form of acute toxemia veratrine would be preferable.

When the storm has passed the cerebral tissues may be encumbered with debris, and a prolonged course of absorbent remedies may be advisable. Sluggishness of the liver may demand an evening dose of a grain of emetine occasionally. Whatever remedies may be indicated they will be required for a prolonged period if we expect to rid our patient of the difficulties remaining after such an attack. However, either form of the malady may enable us to exercise a degree of control over a recalcitrant patient impossible previously.

## PART XI

# ANIMAL PARASITES

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### PSOROSPERMIASIS

The lowest forms of protozoa are known as psorosperms, sporozoa, and from their relation to cells as cytozoa. The amœba coli of dysentery belongs among them, and such blood parasites as the malarial plasmodium are closely related. Several coccidia are found to produce this disease in man. The coccidium oviforme causes liver disease, with tenderness, chilliness, fever, malaise and stupor progressing to coma. The tumors may be felt projecting from the surface of the gland. In a case reported by Osler death occurred on the 14th day.

In an intestinal form nausea, vomiting, diarrhea and the typhoid state may be presented, the kidneys being affected as shown by hematuria and irritability of the bladder. In the skin the parasites cause follicular keratosis, with hard, crusty papules, becoming confluent; on the face, lumboabdominal and inguinal regions. In carcinoma, epithelioma and Paget's nipple disease coccidia are to be found in and between the abnormal epithelial cells. Their significance is as yet uncertain.

Prophylaxis consists in cleanliness as to the preparation of vegetables eaten raw, which may be contaminated by the excreta of infected animals. The treatment is as yet strictly symptomatic, the only specific observation being the destructive action of quinine solutions on the dysenteric amœba. Would the blood-vessels carry this drug to the parasite if it were given to saturation?

### DISTOMIASIS

The liver fluke, *distoma hepaticum*, may be transferred to man from the horse, goat, ass, sheep or rabbit. It is over an inch long, and lives in the biliary passages, being discharged with the feces. The ciliated embryo escapes from the egg, is swallowed by a member of the snail family, in which it undergoes development into a sporocyst, which gives origin to radiæ or parent nurses. These give birth to daughter radiæ or cercariæ, which leave the snail and attach themselves to aquatic plants,

where they await the time when they and the plant will be swallowed by some animal, and in due time return to torment the higher animal from which their remote progenitors set forth on their wanderings. Why so much trouble should be taken to prepare a means of injuring the health of man or animal we leave to those who fully believe that nothing is created in vain.

When the trematodes collect in sufficient numbers in the biliary passages the liver enlarges, jaundice and ascites ensuing. Pain is often present, and heart murmurs often coexist. Hepatic atrophy follows in time. Sometimes they cause a peculiar barrel-shaped bulging, with the abdominal walls over the liver tense. In a Japanese epidemic there were noted emaciation, diarrhea, hepatic enlargement and ascites.

The prognosis is fatal, the treatment not yet devised.

Possibly salicylic acid, which is taken up by the liver, might render the biliary passages unpleasant to the intruders, or the odor of the sulphides pushed to saturation might induce in them a desire to move out. Failure of the old methods does not signify that no remedy exists but simply that no one has as yet hit upon the right one.

Other members of this interesting group are the *distoma lanceolatum* of cattle; *crassum*, a larger variety; *sibiricum*, *pulmonale*, *spatulatum* endemicum, *amphistomum hominis*, *hematobium*. The *pulmonale* or lung fluke has been found in the tiger, hog, dog and cat. It prevails in man in Japan and China. It is 8 to 16 mm. long, 4 to 6 broad, 2 to 5 thick. The flukes with eggs are found encysted together in the lungs of affected individuals. These are swallowed by man, encysted or as free embryos in the drinking water. It has been found in hogs in the United States, and may be quite frequent but mistaken for tuberculosis.

The majority of cases recognized are among farmers. The ages varied from eleven to thirty years in Stiles' cases. Cough is usual, with rusty sputa. Jacksonian epilepsy has followed their migration to the brain. The diagnosis is made by finding the eggs in the sputum, large dark-brown, thick shelled, operculated ova. The prognosis depends on the number of the parasites and the age of the patient, the young and old bearing the disease badly. The treatment is strictly prophylactic.

The blood fluke, *Bilharzia hematobia*, is a narrow worm with anterior abdominal sucking disks. It prevails throughout Africa and penetrates the skin of bathers in the rivers. It may also enter with the drinking water. The parasites are found in the bladder, the pelvis of the kidney and the veins, especially the portal. It causes hematuria and dysuria. The ova may be detected in the urine. Prophylaxis seems to



look with suspicion in Africa on the use of raw water for drinking and bathing. The extract of male fern has been recommended internally.

## ASCARIASIS

The *ascaris lumbricoides* or round worm is the most common of the intestinal parasites of man. It may appear in the second year. It inhabits the duodenum and jejunum and may be present in large numbers. The writer has known seventy-five to be discharged at one time by a child. It resembles an earth worm in shape, but the male measures four to eight inches in length, the female nearly double this. The head has three toothed papillæ, the tail is straight in the female and curved in the male. The worms develop from eggs .05 to .06 mm. long, elliptic, dark red, with a thick tough envelope. They enter the human stomach through food and drink. This worm sometimes migrates into the stomach whence it is vomited, or into pharynx, mouth, nares, larynx, trachea, Eustachian tube and bile ducts, where it may cause serious trouble or even death.

The worms may be present even in numbers and give rise to no recognizable symptoms. In the case above referred to the mother acknowledged that she "had not noticed anything whatever ailing the child". When the worms migrate, however, serious symptoms may result. In some cases the presence of the worms in the intestine is attended by colicky pains, nausea or vomiting, indigestion, diarrhea, restlessness, very often irritability of temper, loss of appetite, itching at the nose or anus, disturbed sleep with grinding of the teeth, salivation and nervous twitchings. In children with weak nervous equilibrium these worms may cause convulsions, chorea, dilatation of the pupils, headaches, mental disorders or contractures.

**Complications:**—Obstruction of the bile ducts will cause jaundice. The intestines may be obstructed by masses of worms. Entering the air-passages during the night, suffocation may follow. Abscesses have pointed externally and discharged these worms.

The diagnosis can be made by finding the worms or their ova in the stools. The prognosis is good if the worms remain in their proper place.

Worms may be prevented by the use of absolutely pure drinking water. In order to obtain a good effect from anthelmintics the patient's bowels should be cleared by a laxative and very little food given for thirty-six hours; then calomel and santonin may be given, 1-10 grain of calomel and 1-2 grain of santonin to a child four years old, repeated every hour until the urine shows a distinct tinge of yellowish green.

The vision is generally similarly altered, everything appearing to the patient to have a chlorine-green tint. Spasms are said to occur sometimes but the writer has never known this to happen when *santonin* and *calomel* have been given together. Another laxative should follow. The treatment may be repeated twice a week until no more eggs can be detected in the stools. Most physicians are satisfied when a few worms are brought away. Investigations made at the Children's Hospital in London some years ago showed that not one of the ordinary anthelmintics would completely clear the alimentary tract so that no more eggs appeared in the stools. The only remedy that succeeded in accomplishing this was *cowhage* down. To prepare this the pods are dipped into syrup and scraped off until the syrup is thick with the down. This is then administered in teaspoonful doses. It does no apparent harm to the patient, but the worms are passed penetrated in every direction by thousands of the prickles. *Chelonin* has been recently suggested as an effective remedy for these and other intestinal parasites. Many reports have been received by the writer testifying to the efficacy of this remedy. It is usually administered in the formula suggested by Dr. Barron, each granule containing *chelonin* gr. 1-6, *santonin* gr. 1-10 and *podophyllin*, gr. 1-33. Of these a child from six to ten years of age should take three at bedtime and one every two hours next day until effect.

### OXYURIS VERMICULARIS

The seat, pin or thread-worm inhabits the rectum, ascending to the colon. It is a small white worm, the female about half an inch long, the male one-sixth inch. They may be present in enormous numbers. When the ova have been swallowed the eggs develop in two weeks. The latter are oval, 1-500 inch in length, and difficult to kill. These worms are discharged with the feces and often crawl out voluntarily, sometimes entering the vagina where they cause intense itching. The eggs are usually taken into the stomach with vegetables and fruits that are eaten raw. Scratching sometimes infects the finger nails which carry the eggs to other parts. These worms cause intense itching about the anus, with rectal burning and *tenesmus*, inducing restlessness and disturbing sleep. The itching is worse at night. Any eruption about the anus with itching should lead to an examination for the worm. Many nervous symptoms may result and bad habits have been induced by the irritation.

The diagnosis is made by the rectal irritation, and the detection of the worms in the feces, or of their eggs. The prognosis is good.

**Treatment:**—The remedies recommended for round worms may be usefully given to destroy thread-worms anywhere above the rectum. In this we may reach them better by enemas. The rectum should be washed clean of feces and then a pint of decoction of quassia should be thrown in. Other remedies found useful by enema are phenol, turpentine, tannin, vinegar, camphor, calcium sulphide and oil of eucalyptus. The injection should be repeated twice a day for two weeks. Obstinate recurrences show that worms are breeding in the cecum, and in this case anthelmintics must be given by the stomach. The eggs may be deposited in the folds around the anus; for this reason, as well as to relieve the itching, mercurial ointments may be applied.

*Ascarus Alata* or *Mystax* infests the intestines of the dog and cat, and a few cases have been found in man. The treatment should be the same as that for the round worm.

*Trichocephalus Dispar* is a worm two inches long, the anterior two-thirds of its body being hair-like, the posterior portion thick, straight and blunt in the female, rolled in a spiral in the male. It inhabits the cecum, sometimes the colon also, and is found in great numbers. It is more common in Europe than in America. Infection is caused by swallowing the eggs, which are about 1-500 inch in length. No special symptoms have been attributed to its presence. Diagnosis is made by recognizing the eggs in the feces. No especial harm seems to be caused by the worm, but if the host does not care to harbor the squatters they may be driven out by a few doses of cowhage down or male fern.

## UNCINARIASIS

The *ankylostomum* or *uncinaria duodenale* is a nematode worm, the female half an inch long, the male somewhat shorter. The body is thread-like, the head conical, the mouth large, bell-shaped, surrounded by a horny capsule with four hooked teeth below and two above. This worm inhabits the small intestine. The eggs develop in mud, the larvæ remaining dormant until taken into the human stomach with water, food or the dirt on the hands. They develop in the bowel into the mature worms, but do not breed there.

In many cases these worms enter through the feet, causing what is known as ground-itch, and thence penetrating to the intestines. The disease caused by them prevails over all the Gulf and South Atlantic states, as far north as Southern Illinois, and in Puerto Rico. The hook-worm abstracts its nutrition from the plasma of blood in the intestinal vessels. It is found in the mucous or submucous coat coiled up in a



little blood cavity. Chronic catarrhal enteritis attends and the heart is frequently enlarged.

The chief symptom is a progressive anemia, the skin being yellowish or dirty gray, the rapidity of the symptoms depending upon the number of the parasites. The anemia sometimes resembles the pernicious form. The red cells and hemoglobin may be largely reduced, the cells being pale and irregular, with many normoblasts. Loss of appetite, colic, nausea and vomiting, constipation and diarrhea, are often present. In acute cases there may be marked debility, dyspnea and dropsy. The weight is sustained. Edema of the ankles, insomnia, headache, faintness, palpitation and scanty perspiration are common. The kidneys are unaffected. There may be slight fever, and ulcer of the cornea has been reported. One of the most interesting features of this disease is its effect upon the mental functions. The patient is sluggish and dull, exerting himself no more than is absolutely necessary. An investigator in the South called at various schools and asked for the especially dull scholars. In every instance he found that these were affected with hook-worms.

Hookworms cause the chlorosis of Egypt, tunnel or mountain anemia of Italy, brickmakers' anemia in Belgium, and the cachexia of coal-miners, as well as the peculiarities of the Southern clay-eating cracker.

**Diagnosis:**—This lies in detecting the eggs or worms in the stools. The eggs are oval, 1-500 inch in length, the shell much thinner than is that of the round worm. The disease continues for years. If not treated, death may result from the progressive anemia, diarrhea and nutritive disorder.

**Treatment:**—In infected districts the water should not be drank until it has been boiled, and people must be warned against going barefooted. Thymol is the best remedy as yet known, but must be given in doses that would ordinarily be considered perilous.

Thirty grains should be given every two hours for four doses, on an empty stomach, and followed in eight hours by a full dose of castor oil. The treatment should be repeated every week until no more worms or their eggs appear.

## TRICHINIASIS

The trichina spiralis is a worm, the male about 1-20 inch long, the female more than double this length. The head is pointed and slender, the tail blunt. It is found in the intestines of the rat, dog, cat, hog, and man. The embryo is about 1-25 inch long and is found coiled up in a

capsule in the sarcolemma. When the muscular tissues containing these embryos are eaten by animals the larvæ are liberated by the digestion of the capsules, and after two to four days' residence in the intestine become sexually mature, and within a week more produce many young. The parents survive about a month, the female bringing forth many broods. The embryos at once penetrate the walls of the intestine and pass along the connective tissue planes to their destinations in the muscles, which they reach in seven to ten days from the time the trichinatus meat was eaten. Here their presence causes local inflammation and irritation, during the two weeks occupied in their further development. In four to six weeks the fibrous capsule is formed, and in this the worms may exist in a dormant state for years. The capsules in time become calcareous.

The diaphragm is most thickly studded with the embryos, then the intercostals, abdominal muscles, neck, larynx, head, eyes and extremities. They are present in the bowels up to the seventh week. In the muscles they cause inflammatory disturbance with the usual results. The trichinæ are visible to the naked eye as little whitish specks, oat-shaped, along the muscular fibers.

Trichinæ are derived by man from infected pork. It was once thought that the pig obtained the parasites from the rat, but investigations has made it evident that only the rat about packing-houses is thus infected from consuming infected offal, while the country rat is sound. About two per cent of hogs slaughtered and inspected in the United States are trichinatus (Salmon), and Osler says that from 1-2 to 2 per cent of all (human) bodies examined post mortem contain trichinæ. This would indicate that trichiniasis is much more frequent than is suspected. The infection comes from eating raw or insufficiently cooked pork, since thorough cooking destroys the life of the parasites.

**Symptoms:**—Within two days after eating infected pork the eater presents symptoms of acute gastrointestinal disorder, nausea, vomiting, diarrhea and colic, the attack sometimes being choleraic in violence. A sense of debility comes on before the embryos have begun to penetrate the muscles, which may be due to a toxin secreted by the trichinæ. There may be soreness in the abdomen as the intestines are irritated by the ingress of countless parasites. From the tenth to the fifteenth day migration commences and a chill ensues, followed by fever ranging from 101 to 104 F., and evidences of inflammation of the muscles. These become tender, painful, swollen and edematous, sometimes contracted and always painful on motion. The functions of mastication, deglutition or phonation, etc., may be hampered as the muscles concerned are

invaded. As the diaphragm is most infested, dyspnea is an early and prominent symptom. The pulse and fever show non-periodic variations, and the temperature may be subnormal. Edema appears about the seventh day, about the eyes, and extends widely. It remains some days then subsides and may return. Ascites has occurred. Edema of the larynx or bronchopneumonia may cause serious trouble. Free sweating may occur and continue for weeks. Boils, nettle-rash, pruritus and other cutaneous manifestations may occur. Various nervous symptoms may be present, such as headache, insomnia, restlessness, delirium, dilatation of the pupils, suspension of tendon reflexes, and the blood becomes impoverished, the patient losing weight and strength rapidly. There is an increase of the eosinophiles, up to 37 per cent (Brown). Albuminuria occurs sometimes, and the condition may simulate that present in typhoid fever. Pulmonary complications are most frequent. The course varies with the number of invaders and the muscles they attack, from two weeks to two months or more. Usually the embryos become encysted within six weeks.

**Diagnosis:**—Gastrointestinal irritation, followed by sudden swelling about the eyes, after muscular soreness, with fever and later profuse sweats, tender hardness of the muscles, tendency to flexures or at least pain on moving some muscles especially those known to be most affected in this malady, the marked dyspnea, and general edema following that of the face, hoarseness and rapidity of respiration without apparent cause, are significant. The diagnosis is rendered positive by examining a fragment of affected muscle; or recognition of trichinæ in the pork, or in the intestinal mucus. In ptomain poisoning we have a rapid development and course, dryness of the throat and skin, jaundice, ocular disturbance and no edema or muscle implications. Rheumatism, cholera, typhoid fever, and acute polymyositis are mistaken for trichiniasis by careless observers only.

The prognosis depends largely on the number of invaders and the acuteness of the attack. Early diarrhea is favorable as thereby many trichinæ are swept out of the bowels. Packard found the mortality about 24 per cent. Death may be delayed till the sixth week.

**Treatment:**—Discourage the eating of raw pork. Packers should destroy the offal of trichinatus hogs and carefully prevent the access of rats which might thus become infected and in turn pass the disease, to other hogs. Inspection should be totally independent of the packers, interests.

As an early diarrhea improves the diagnosis, the indication is to empty the stomach and bowels as quickly as possible after partaking



of the infected meat, which may be done by an emetic of mustard water and an ounce of castor oil to which a drop of croton oil may be added in dealing with healthy adults. Follow this with glycerin, absolutely free of water, a tablespoonful every hour. Why?

Dornblueth, experimenting with trichinæ embryos, found that glycerin applied to them on microscope slides acted as sulphuric acid does on animal tissues, abstracting water so energetically that the tissues were charred. Acting on the suggestion he treated some cases with glycerin in the doses mentioned, and found it harmless to the patient, while the disease did not develop. But as the glycerin acts by absorbing water from the embryos it is obvious that unless it comes in contact with them while still greedy for water, it is useless. Dornblueth advised that the glycerin be also given in elastic keratin capsules which might carry the remedy undiluted into the intestines, and if keratin would do this it would be a wise method. Meanwhile as we have no such capsules we must rely on the ordinary administration. It is obvious that the advice to "try glycerin," without this explanation, is of slight value.

It seems obvious that here is a field for intestinal antiseptics, when the case is recognized while the parasites are yet in the alimentary canal. Of these agents the oil of male fern would seem best, as its destructive power over other parasites is well proven. Give full doses as for tape worms, or administer an ounce of oil of turpentine. The parasites that have penetrated beyond the bowel are not supposed to be within our reach. Picric acid has been suggested, and it should be tried. The treatment here is symptomatic:—the defervescent alkaloids for fever and inflammation, heart-tonics to sustain the vital forces, cicutine for muscular distress, anodyne liniments with gentle massage and faradism, and a liberal but non-stimulating diet. Possibly the x-ray or static electricity may prove destructive to these parasites; they may prove amenable to the influence of the sulphides, echinacea, bebeerine, berberine, quinine; some agent that goes to the muscles or the connective tissue may prove too much for the intruders. By trying every possibility we are more apt to find out things than by sitting down and waiting till they come to us.

## FILARIASIS

Several varieties of filariæ are found in man, the principal being the *filaria sanguinis hominis nocturna* and *f. s. h. diurna*. The first is a white opaline thread-worm, the male over 3 inches long, the female twice as long. The second is known only in embryos, which show gran-

ulations. It prevails throughout the tropics up to Spain in Europe and Charleston in the United States. A large proportion of the people may be affected—in Samoa one-half. The embryo of nocturna is about 1-80 inch long and as thick as a red blood corpuscle. The skin or sheath is loose and too big for the worm. The parasite is rarely to be detected in the blood by day but becomes abundant as night comes on, the contrary being the case with diurna. In patients who sleep by day the worm is found during sleep; but the appearance of the parasites in increasing numbers commences hours before the sleep begins. During the time of their disappearance from the peripheral vessels they collect in the arteries and the lungs.

Filaria embryos are taken up with the blood by the mosquito, in whose body they undergo development, first casting off the sheath, and in from six to twenty days or more are ready to enter the blood of the next victim tapped by the mosquito. Whether the parasite can also enter man by drinking water or any other route than by the bite of the mosquito is uncertain. The *Culex* is probably the insect involved. The filaria come to sexual maturity in the lymphatics, whence the new brood pass to the blood.

**Symptoms:**—Like the round worm the filaria may cause no disturbance unless the parents by their size and number block lymphatics or blood-vessels. They may plug the thoracic duct, or induce inflammation, with lymphatic engorgement or edema. The lymphatic varix may be extensive, with collateral circulation established. The contents of the dilated vessels are chylous. The dilated abdominal mass may be a foot in diameter. The scrotum may be similarly enlarged, or the glands in the groin; the genitourinary lymphatics may open into the urinary channels and chyluria result, or we may have chylocele or chylous ascites. Other lymphatic glands or tracts are less frequently affected. In such localizations the filariæ may in time disappear from the blood.

In elephantiasis Arabum it is unusual to find filariæ in the blood. This malady is regarded by Manson as due to filariæ, though they can not as a rule be found in the blood. He attributes the lymph stasis to the presence of filarian ova by which the channels are blocked. These may be prematurely extruded by mechanical causes operating on the parasites in the lymphatics of the limbs, and the ova being larger than the lumen of the vessels cause obstruction. This, however, gives rise to edema, but inflammation is necessary to develop true elephantiasis, and this may be readily excited in such a tract by the slightest injury. Hence frequent attacks of erythema are characteristic of this malady. Hyperplasia of various tissues ensues.

The death of a filaria may be followed by its absorption, or it may induce suppuration and abscess. Lymphangitis is common in all forms of filarial disease, and has been termed elephantoid fever. The lymphatic vessels and glands swell, a red streak is visible, with headache, anorexia, disturbance of the stomach and rarely delirium. Following the initial chill the fever may rise high and the skin become tense and hot. The attack ends in a discharge of lymph or in profuse sweats. There may be a close similarity to malarial fevers. The part should be elevated, cooling lotions applied, the bowels cleared, and the fever combated by the defervescent alkaloids applied as per indication. Mercurial ointments applied over the inflamed vessels moderate the inflammation and hasten resolution. The greatest comfort results from the application of a rubber bandage to the affected limb during the intervals, continuously, the erythematous attacks becoming less frequent and the enlargement subsiding.

Varicose inguinal glands, enlarged scrotum, chyluria and chylocele are variously combined. They come on without acute symptoms and are unattended with suffering. Lymph can be withdrawn by aspirating, which coagulates rapidly and may contain living embryos. This tumor should not be mistaken for hernia. Any chronic swelling in this region, in the tropics, should be regarded as possibly filarial (Manson). They are best let alone; and usually form an essential collateral circulation. Other lymphatic groups are less frequently affected. When the scrotum is affected erythema is common, abscess rare. Treatment consists in elevating the mass, applying elastic compression, and in case of necessity removal by amputation. Manson urges that the entire mass be removed, the gap being closed by traction on the integument of the thighs.

Chyluria results from rupture of a filarial varix into the bladder. Aching in the back, groins and pelvis may precede the appearance of the milky urine, or obstruction of the urethra may be the first indication. The urine may be pink or red. It coagulates, and usually contains embryos. Chyluria may be continuous or intermittent. It causes anemia, debility, depression and incapacity for severe exertion. It is especially liable to appear during pregnancy or lactation, or after muscular strain. Manson denies that any treatment influences the malady beyond rest and similar general measures that may be indicated. Lawrie advised thymol and others methylene blue, but it is a question whether any means should be employed to kill the parasites which are far more dangerous dead than alive. Orchitis and synovitis occasionally result from filarial invasions.



Elephantiasis may affect not only the scrotum and legs but the vulva, arms, breasts, or limited areas of the skin.

Prophylaxis in countries infested with filariæ consists in protection against mosquitoes, and the use of pure water. Patients should likewise be screened to prevent infection of mosquitoes.

### GUINEA WORM: *FILARIA MEDINENSIS*

Guinea worms are found in India, the west coast of Africa, and in one part of Brazil. Occasionally they are seen in sailors entering our hospitals. They attack the horse, dog and ox. The male has not been recognized. The female measures one to three feet in length, or more, and is 1-10 inch thick; milkwhite, smooth, the tail hooked, the head ending in the cephalic shield, with six papillæ. The body is almost completely occupied with the uterus gorged with embryos. This worm inhabits the connective tissues, and showing herself beneath the skin anywhere, disappears and may show up lower down, finally approaching the surface about the ankles. A small blister rises here, breaks and the head of the worm protrudes with an inch of the body. If this is broken off the worm disintegrates and the result is septic suppuration along its course. The head is carefully drawn out as far as it is loose and wound on a match stick, and supported by a bandage. Each day a few inches more can be thus withdrawn, until in a week or more the entire worm has been wound on the stick and extracted.

The worm enters the human stomach with water drinking. The custom now is when the worm appears to encourage her to discharge her young by applying water to the surface of the blister, when the embryos will be extruded. This will continue for two weeks, when the parent worm will emerge.

No efforts at traction must be made while the embryos are being emitted. Emily shortens the period by injecting into the worm a solution of mercury bichloride, 1 to 1000, which kills the parasite, after which extraction is easily accomplished. The embryos enter the body of a marine animal, the cyclops, and there undergo a stage of development before they are ready to attack their next host.

Prophylaxis requires the use of only pure water as a beverage in infected districts. Possibly the tendency to the use of alcoholic qualification has more to justify it than the prohibitionist would care to admit.

Other filariæ that attack man, generally in Africa, are the *f. immitis*, *labialis*, *lentis*, *trachealis*, *bronchialis*, *loa*, and *hominis oris*.

The *eustrongylus gigas* is a huge worm infesting animals, fish being the intermediary host, rarely causing hematuria in man. *Anguillula*

stercoralis is found in the stools of some tropical dysenteries, along the Mexican Gulf. Echinorhynchus moniliformis is found in rats and has been detected in man, in Sicily.

### SLEEPING SICKNESS: TRYPANOSOMIASIS

Trypanosoma is a flagellated hematozoon, transmitted by a fly, found in other parts of the world but not in America. The malady begins with erythema and edema, cachexia developing with wasting, debility and feebleness of the legs. Irregular fever rises to 104 with corresponding pulse rate, restlessness, delirium, difficulty of speech, Cheyne-Stokes respiration and coma. The spleen may be enlarged and tender. Anemia follows. The lymphatic glands contain many of the parasites. The coma which gives the disease its common name develops late.

Several observers report favorably on the use of arsenic in sleeping sickness. E. J. Moore found hypodermics of an ounce of 1 per cent sodium arsenate solution proved useful in cattle infected, while Ehrlich and Shiga found that trypan red induced a reaction in the body fatal to the parasites though it had no direct influence. Laveran found that arsenous acid, 1 to 20,000 of the animal's weight, cleared the parasites from the blood of infected rats. Koch confirms the value of arsenic.

### ECHINOCOCCUS

This tapeworm especially infests the dog. It is about  $\frac{1}{4}$  inch long, and consists of three or four sections. The intermediary hosts are the hog, ox, horse and sheep, rarely man. Dogs ingest the larvæ and in two months the mature forms are developed, eggs, larvæ or adults being voided.

The six-hooked embryos penetrate the intestinal walls or the portal vein and pass into the viscera or muscles where they develop into larvæ and form hydatid cysts. The irritation they cause induces the formation of a fibrous envelope about them. The cyst consists of two walls containing a clear fluid and from the inner wall project numerous secondary cysts containing heads of larvæ. In these a third generation may develop. In these are found the heads of future tenia, with four sucking disks and a circle of hooklets. Each scolex that reaches the stomach of the dog becomes an echinococcus. The fluid has a specific gravity of 1005 to 1012, and consists of 98 per cent water, sodium chloride, carbonate and sulphate, cholesterin, uric acid and traces of dextrose. When the parasite dies the cyst contents become thick, puttylike, granular,

or calcify. The cyst may discharge its contents into surrounding tissues or cavities, causing suppuration or new cystic formations, or being discharged through the natural emunctories.

Hydatids come usually from careless handling of dogs, and allowing them to inhabit the kitchen. Women and young children are most affected. Where men and dogs live together as in Iceland, the disease is most prevalent. The liver is most frequently affected, then the lungs, bowels, urinary apparatus, brain and cord.

**Symptoms:**—In the liver the development may not be noted by symptoms unless a hepatic duct is occluded, when jaundice will follow. Progressive decline in strength and loss of flesh, sense of weight and dragging, and the appearance of a fluctuating hepatic tumor, rarely pain, indicate the development of the parasite in the liver. Pushing up the diaphragm it may cause dyspnea and cough. Compressing the portal vein the spleen swells, the intestines are congested, hemorrhoids develop, followed by ascites, etc. The sac may discharge into the air-passages, the intestine, or the pleural or peritoneal sacs. Suppuration is indicated by chills followed by fever of septic type. Unless evacuated externally, rupture causes collapse.

If presenting anteriorly the tumor may display visible bulging. Palpation reveals a fluctuating mass, light percussion on the opposite side giving the hydatid thrill. The liver elsewhere is uniformly enlarged, the spleen passively congested; percussion is dull over the mass, the stomach displaced, and a short, sharp, booming sound has been described on percussing the tumor (Santoni).

**Differential:**—At first this is inferential, until the mass can be isolated by physical examination. Anders gives the following:

**Hydatid cyst:**

history negative except for dog fancy.  
no pain or jaundice.  
growth depends on location.  
hydatid thrill perhaps.  
not very movable.

history negative.  
urinalysis negative.  
hepatic tumor.  
duration varies, uremia rare.

slow onset, no pain or fever.  
changed position does not alter signs.  
aspiration reveals hydatid elements.  
chronic course.

**Swollen gallbladder:**

gallstone history.  
biliary colics and jaundice.  
location uniform.  
never present.  
more movable.

**Hydronephrosis:**

renal stone or vesic inflammation.  
shows renal disease.  
iliac tumor, does not move with liver  
brief; often ends in uremia.

**Pleural effusion:**

sudden, pain, fever, dyspnea.  
percussion alters with position.  
albumin, lymph, high s. g.  
usually acute.

In the lung hydatids most frequently attack the right lower lobe, sometimes the pleura; causing pain, fever, cough, dyspnea, bulging, effusion, hemoptysis, sputa containing hydatid elements, dullness over



the tumor. Occasional results are empyema, perforation of the chest wall, dislocation of the heart, and pulmonary gangrene from compression. The location, curved upper edge of dull area, unchanged by change of posture, and absence of wasting, distinguish from phthisis and pleurisy.

Echinococci have been found in the mediastinum, heart, brain, cord, meninges, spleen, kidneys, peritoneum, bladder, prostate, testicle, ovary, uterus, omentum, mesentery, pancreas, arteries, lymphatics, thyroid, muscles, bones, joints, parotid gland, orbit and mamma. This list might be enlarged.

Urticaria sometimes follows puncture of a hydatid cyst, and is then diagnostic. The prognosis is grave, but cases may exist for many years. Calcification sometimes occurs. Rupture and suppuration are to be dreaded.

Prophylaxis includes the feeding of dogs with cooked meat, and limitation of association with them. Treatment is direct and mechanical, including excision, electrolysis, and the injections of the cysts when accessible with iodine, bile, etc. Otherwise the drug treatment is strictly symptomatic. The static spark, x-ray and similar applications are yet to be tried.

## TAPEWORM

The tapeworms are taken into the human alimentary canal with the flesh of infected animals as embryos, develop there, and their ova pass out to be developed elsewhere. In the host animal they penetrate to the muscles where they form small cysts, containing a head, the scolex or nurse. These cysticerci are known as measles. If the animal lives several years the cysts die and are calcified. If eaten as food the cyst develops into a tapeworm. Three months later the matured segments of the worm commence to pass out of the bowel, some with the stools, and a few by their own system of locomotion crawling out of the anus. Each segment constitutes a single hermaphrodite animal, the uterus filling most of the body. It is supposed that the various segments are fertilized by others as the worm shifts its position in the bowel.

*Tenia solium* is the most common form found in Europe. It inhabits "measly" pork, and is destroyed by thorough cooking. The worm develops to a length of six to twelve feet, the head round and the size of a small pinhead, armed with four suckers and 26 hooklets. The neck is like a bit of thread, growing thicker and the segmentation more evident as it leaves the head, flat and wider until the lower third is reached, when a segment becomes narrower and longer, the mature ones being

about 1-2 inch long, and 1-4 inch broad. The uterus is crowded with eggs, each containing an embryo with six hooklets.

*Tenia mediocanellata* or *saginata* is obtained from beef. This is the most common in the United States. The head has disks but no hooks, the worm grows to a length of 20 feet, and the segments are larger in all dimensions. The matrix is differently arranged in each variety of *tenia* and constitutes one of the means of differentiating them. The proglottides of this one are especially apt to crawl out at the anus.

*Tenia lata*, *bothriocephalus latus*, the fish tapeworm, is common in northern Europe and Switzerland. It reaches a length of 30 feet. The head has no hooks but two lateral sucker grooves. The segments are short and broad, the matrix arranged as a rosette, the ova larger, thin-shelled, with a lid. They develop only in fresh water. Cats are infested with tapeworms and the ova they leave around the house are lidded. The *lata* embryos develop in the tissues of fish and when these are eaten, insufficiently cooked, pass alive into the intestines of the eater.

**Symptoms:**—The existence of tapeworms is usually unsuspected until the proglottides commence to pass in the stools. In nervous persons almost any neurotic manifestations may follow the *knowledge* of such infection. In some persons the worm is accompanied by anorexia alternating with voraciousness, diarrhea and constipation, colicky pains and abdominal qualms, nausea, salivation and intestinal indigestion. Debility, mental unrest, irritability and emaciation, pruritus of nose, anus or skin, disturbances of vision, tinnitus, choreic manifestations, and convulsions are with some doubt attributed to the presence of the worms. In one of the writer's cases homicidal mania was present, and disappeared with the expulsion of the parasite. But it is impossible to separate the symptoms really directly due to the worm from those that are wholly subjective.

The diagnosis is made by the presence of the segments in the stools. They might possibly be confused with flakes of onion or mucous casts, but it is difficult to conceive how. When the segments are not passed the eggs may be detected. The prognosis is good.

**Treatment:**—Prophylaxis consists in eating wholesome meats, well cooked. Use pure water for drinking. Keep domestic animals in their place, and keep an eye on their health, and if possible have their stools watched. Cats may leave the little white sandlike eggs on cushions where they rest.

For at least two days keep the patient on a diet of bread, milk and light soups, with saline laxatives; after the feces have been completely removed, instruct the patient to take no breakfast, and during the morn-

ing give the tenicide selected. In three hours follow with a brisk cathartic, and when the bowels begin to move have the patient sit on a jar of water that this may float the worm up and prevent the slender neck breaking off, leaving the head to develop anew. If the head is not found we must wait three months, when if it has retained life the segments will be ripe and appear in the stools. As a rule, if the larger part of the neck comes away, the death of the head will follow. Note that there may be more than one worm present.

The writer has succeeded with oil of male fern, the seeds of the pumpkin, and oil of turpentine in doses of one or two ounces; but never with kousso or pomegranate. He has failed with all remedies when not administered in good quality and according to the above system. He prefers male fern for adults, and pumpkin seed, in doses of an ounce of the dried seeds, for little children. In the seeds the tenicide principle is contained in the greenish film surrounding the kernel, and as the latter contains a fixed oil which is laxative, the two may be given together, being simply fed to the child as shelled, like nut kernels. Kousso is abortifacient and unsafe for pregnant women. The addition of chloroform renders any tenicide more effective. The adult dose of oil of male fern is half to one dram. Thymol, pelletierine and kameela have tenicide powers.

How should we determine the dose for children? If as usually assumed, tenicides act directly as poisons to the worm, it seems that the same dose should be required to kill a worm in an infant as in an adult. This has been denied, and some claim that the dose may be regulated by the age or weight as with drugs acting distinctly on the patient. The subject is not mentioned in any recent text-book on Practice.

Overdoses of male fern are toxic and have even caused death. Struempell cautions against exceeding doses of two to three drams, and French advises against castor oil as rendering the toxic principles soluble.

In Abyssinia where the practice of eating raw beef renders the entire population subject to tenia, kousso is employed as a corrective, an intimation to the worm that better behavior is expected of it, but not as a means of destroying its life. Other remedies are used for this latter purpose which have not been introduced into civilized lands.

The patient may require tonics after the evacuation of the worm, especially iron which seems distasteful to all intestinal parasites.

Tenia nana is a miniature tapeworm, less than an inch in length, believed to be a cause of epilepsy and enuresis nocturna, in children. This and other forms of tenia sometimes found in man are amenable to the same treatment as above described.



### SPIDERS (ARACHNIDÆ)

*Pentastoma tenioides* inhabits the nasal passages of the dog or horse, sometimes attacking man, the ova being discharged by sneezing. Larvæ have been found in the lungs, liver and kidneys.

The *Acarus Scabiei* gives rise to the itch. The female is about 1.50 inch in length and breadth, the male half these dimensions. They pierce the skin, residing in a burrow or cuniculus, in the end of which may be found the female with eggs. The lesions visible are mainly due to scratching. The parasites are easily killed but reproduce from some left in the clothing. Any ointment of sulphur, mercury, naphthol or phenol, will destroy them—especially one of copper oleate, 1 part to 16. The patient should take a hot bath with antiseptic soap, having all clothing put to soak in a tub of chloride of lime solution, and have clean clothing ready for next morning, the bath being taken on retiring. The ointment should be well rubbed into the affected parts, between the heads of the metacarpal bones on the backs of the hands, and at the flexures of elbows and knees, and not washed off till next morning. One thorough application will succeed where many partial ones fail. Probably saturation with calcium sulphide would destroy the parasites as quickly and more surely.

Other acari infesting domestic animals invade the human skin but die promptly, the human serum being toxic to them.

*Leptus Autumnalis*, the harvest bug or chigger of the north, redbug of the south, is a minute animal with six legs, claws and sharp mandibles. It inhabits grass, and invades the ankles and legs of those who walk over infested patches. It appears as a minute red dot surrounded by the white urticarial zone of irritation it causes. Intense itching ensues. The speediest relief follows touching the bug with choloroform, which instantly kills the parasite. The ointments employed for itch also are effective.

*Demodex folliculorum*, a small parasite found in acne follicles, is not known to arouse symptoms or do harm

### PEDICULOSIS: PHTHEIRIASIS

Three forms of lice infest man—the *pediculus capitis*, *corporis* and *pubis*. The headlouse is about 1.25 inch long, gray, with six legs, the female double the size of the male. She lays about 50 to 80 eggs in a week, in a bag attached to the hair near the skin. These "nits" hatch in three to eight days. They cause itching and an eruption about the

neck and ears. The term *plica polonica* was used to designate cases where the hair was matted with dirt and crusts and supposed to contain bloodvessels.

Body lice infest the clothing. They are much larger than head lice, and deposit their ova on the clothing. Small hemorrhagic dots show where they have sucked blood through the sweat pores. Neglected cases show white scars from scratches, with scaly pigmented patches—"vagabonds" disease.

Crab lice infest the pubis, axilla, eyelashes and brows, chest, and beard.

All lice are killed by saturating the infected parts with kerosene oil and leaving it for a night. The application must be renewed in a few days to catch the newly hatched broods. The clothing should be boiled. All mercurial and naphthol ointments kill lice. Shoemaker advises betanaphthol a dram, in four ounces of cologne water. Tincture of cocculus is effective but not always safe from picrotoxin poisoning.

Bedbugs are to be gotten rid of by sulphur fumigation, and applications of corrosive sublimate solutions to their dwellings. Alkaline lotions or a drop of chloroform relieve their irritation.

Fleas are especially averse to phenol, and may be kept away by dropping bits of blotting paper, wet with it, around the body in bed; or by spraying the carpet with it.

The sand flea or jigger of the south penetrates the skin of the feet to lay her eggs, which appear as a bluish spot about the toenails, with itching. If the embryos escape great irritation and septic ulceration follow. People should wear shoes and stockings, and apply to the feet antiseptic powders impregnated with essential oils to escape this annoyance.

Ticks will loosen their hold if a drop of any essential oil or of chloroform is applied.

Bird and fowl ticks or mites attack men and cause itching. Gnats, mosquitos, bot-flies, and several varieties of flies, attack man and annoy by their stings and by depositing their eggs in his tissues. The larvæ of bot-flies have been found by French apparently causing epilepsy by their presence in the alimentary canal. Several flies deposit eggs that develop into maggots. Some caterpillars cause urticaria, especially one that has recently infested New England, the brown-tailed moth.

The part played by these and other insects in spreading disease to man is just beginning to be comprehended. Typhoid fever, cholera, plague, tuberculosis, diphtheria, yellow fever and malaria, have been positively traced to the intervention of insects, and the possibilities in

this line are by no means exhausted. It is well therefore to wage an unceasing warfare on all insect pests, and to use every means of excluding them from our homes and persons. Sulphur fumigation will drive out everything from the rat to the micrococcus. Suitable means should be employed to keep them out. Probably saturation with sulphides renders one immune against all biting insects, and probably all others. Few of them will attack a surface of skin that is covered with any volatile oil, such as the citronella used at the seaside resorts. This may be secured from too speedy evaporation by incorporating it in soap, the lather applied being allowed to dry on the skin. Solutions of calcium sulphide applied to the exposed skin are found to keep off the voracious mosquitoes of Alaska. The usual strength is 18 grains of chemically pure sulphide to one ounce of glycerin and two of water. This will enable the physician to walk unharmed through an epidemic of yellow fever or by night in malarial swamps with impunity.

It is better to take calcium sulphide internally until the skin exhales the odor of the drug, when one is immune against all insects. Saturation may be sustained indefinitely without injury.



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